The Chemical Age

VOL LXIV 30 JUNE 1951 No 1668

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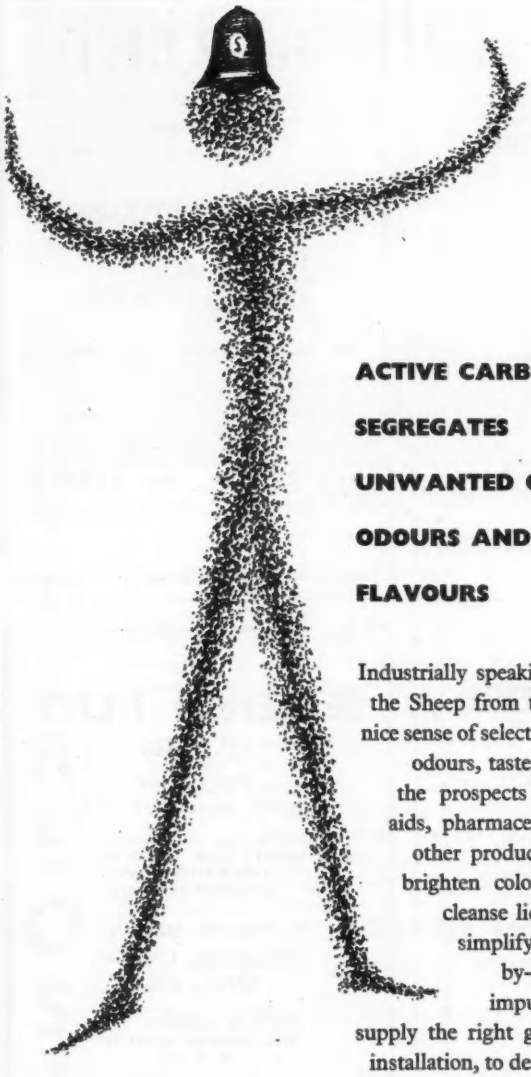

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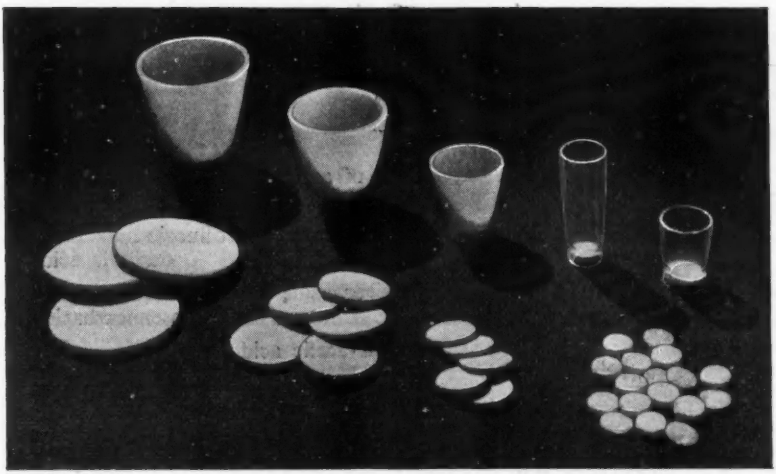

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Factory Inspectors

NOW that the House of Commons has become a legislative treadmill, many matters of urgent or broad public importance must all too curtly be disposed of as 'motions for adjournment'. It was perhaps characteristic of the Cinderella rôle long played by our factory inspection service that no more than a fag-end half-hour of recent parliamentary time, following marathon sessions on the Finance Bill, could be devoted to its present and grievous plight. Little space, too, was given to the discussion in the daily Press, perhaps because it took place so late at night.

The plain and central fact which clearly emerged was that the factory inspectorate is far too short in numbers. During the war recruitment was stopped. In 1949 the maximum establishment was 379, but the actual number of inspectors fell short of this by 50. At present the deficit is still about 40. Against this must be set the fact that the number of factories or workshops that should be regularly visited has risen from 173,000 before the war to 208,000. According to Dr. Charles Hill, who raised this matter in the Commons, only 57 per cent of the normally required annual visits to factories were actually paid last year. No doubt many works managers can confirm this from their own experience in recent years; the calls of the factory inspector have lost their routined regularity and become much rarer events.

It is surely very doubtful whether a maximum establishment figure of 379 is even remotely adequate. A true measure of the inspectorate's post-war task is not expressed by saying that there are now 35,000 more factories under their care. In most of the 173,000 older factories there has been a vast expansion of mechanisation and it would be no exaggeration to assume that the thorough inspection of such a factory today requires twice as much time as it did before the war. Full employment means that there are hundreds of thousands more workers in our factories. However, the ceiling figure of 379 is purely theoretical. In fact the nearest we have come to it is to be 40 or so inspectors short. This is a lamentable situation.

No one in the industry would today take the view that an inspector of factories performs a non-progressive rôle of interference. The men and women in this specialised branch of the Civil Service are public servants in the highest sense of the term. They approach their responsible task by constructive co-operation with management and trades unions and they fall back upon their legal powers only when co-operation is

denied them. To the employer or works manager, indeed, the naturally wider experience of the mature factory inspector in matters of accidents and their causes constitutes a valuable asset. Today many new plants and machines are installed and operated in factories months before they are first seen by an inspector. Overworked and underpaid, the factory inspector is a declining force in the industrial community at a time when he should instead become an increasingly helpful force.

Recruitment for any profession short in numbers is considerably influenced by the remuneration offered during early years. The present scale is unattractive even though salaries were reviewed in 1946/47. In London the young entrant receives £350 a year at 21 rising by £25 per annum to £475 at 26; thereafter the same increments of £5 lead to a £600 ceiling for junior level inspectors. Outside London, the junior scale is about £30 a year less. In short, as Dr. Hill stressed in the House, the junior member of the inspectorate is receiving today only 25-28 per cent more than he would have received before the war. Yet in the main this type of public servant must be drawn from the university graduates, a class of worker in acutely short supply. No one could possibly pretend that there is financial inducement here for a young man or woman of the right type to consider making a career of factory inspection. The present rate at which the cost of living is rising is a final death-blow to any motive of idealism that might previously have impelled a graduate to approach employment as a factory inspector with long-term considerations of promotion or in a spirit of service. Unless these scales are quickly altered, and not by niggardly upward amounts, the gaps in the service will be filled, if at all, only by people of lower calibre or capacity than the responsibilities of the work require.

The Ministry of Labour is clearly trying to organise this important branch of our industrial life and efficiency with a salary scale and establishment ceiling that are both envisaged in out-of-date terms. The target for recruitment—40 to fill the immediate deficit and 15 to 20 each year to fill normal vacancies—is in no way related to the increased industrial activity of the country. Yet the salaries that are offered are unlikely to attract this quite inadequate number of recruits. In the Civil Service fair payment for specialised duties of a technical character is rarely offered; scale adjustments for specific branches of public service are feared by the Treasury not for their own cost but for their possible effect upon other demands from other branches. Nationalisation offers nothing better in the long run for the scientific and technological workers it absorbs.

On Other Pages

The annual subscription to THE CHEMICAL AGE is 35s. Single copies, 9d.; post paid, 1s.; SCOTTISH OFFICE 116 Hope Street, Glasgow (Central 3970). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited.

Notes & Comments

Standards & Productivity

RAW material shortages are apt to encourage the view that it is no longer worth bothering about higher productivity. Such an outlook was deplored by the Chancellor of the Exchequer, Mr. Hugh Gaitskell, speaking at the dinner to celebrate the Golden Jubilee of the British Standards Institutions, held at Guildhall London, on 20 June. Productivity must not be thought of solely in terms of saving manpower, important though that was, but must also be considered as a saving or economising in raw materials themselves, emphasised the Chancellor. The B.S.I., he continued, should be able to play an important part in helping industry generally to make do with less of particular materials by revision of standards, where this should be necessary, and by substitution of one material for another. Such a suggestion, however, raises two considerations. British Standards have attained a reputation for their high quality throughout the world and any 'revision' which necessitated any lowering might well, in the long run, do more harm than good. The Chancellor argued that shortages affected only some firms and none all the time and that industry planned well in advance. This presumably was the basis of his proposal for revision and substitution of materials, for it is, of course, recognised that standardisation is no easy process. A period of years may occur before a satisfactory standard is attained, proved, and tested by the B.S.I., and any revision or substitution might well involve an equally lengthy study and care before its official adoption.

Chemicals & Overseas Trade

BEFORE the end of 1950 the probable effects of raw material shortages were being referred to in company reports of a number of firms in the chemical industry, and doubts expressed as to the possibility of maintaining the level of exports attained in that year. Despite these considered prognostications chemical exports for the first five months of this year were valued at £54,743,759 compared with £38,678,980 in 1950, according to the *Trade and Navigation Accounts of the United Kingdom* (May, 1951). Total value of chemicals, drugs, dyes and colours for the month of May, 1951, was £13,354,473, as against £11,438,400, in the previous month, and £8,508,103 in May, 1950. Exports, in fact, have been marked by a steady rise since the beginning of the year, which is indeed a clear indication of the healthy state of the chemical industry and its continued endeavour to overcome so far, not only the problems of raw material shortages, but also the difficulties of worn out plant and replacement, which can only be accentuated by reduction in steel production. As the defence programme gathers momentum, this must also affect the industry.

Crop Protection

A technical home where practice and science could work together in developing the world industry of plant protection was the objective behind the acquisition in 1945 of the estate at Fernhurst, near Haslemere, Surrey, by Plant Protection, Ltd., as a research centre where visitors, especially those from overseas, could meet to discuss their problems, and in so doing build up friendships and an ever-increasing exchange of knowledge and understanding. How far this has been successful may be judged from the international conference on crop protection, organised by Plant Protection, Ltd., which was held at Fernhurst this week, and was attended by 80 delegates from 39 countries overseas and 40 delegates from Great Britain. It is just over 100 years since Britain was the first in the field in the development of fertilisers, and the chemical industry may feel justifiably proud that this country has now once again given a lead to the world in the science of plant protection. The conference cannot fail to stimulate further progress of the techniques, which if applied generally on the same scale as in Britain, would do much to remove hunger and want everywhere.

Chromium Estimation

Russian Chrome-Tanning Research

THE time required for routine determinations of chromium in extracts, spent liquors and finished leather goods in the chrome-tanning industry can be very considerably reduced, according to a recent Russian investigation*, by a procedure involving oxidation of the ashed material with fused potassium nitrate, followed by destruction of the nitrite by reaction with either urea in an acid medium or a boiling saturated solution of ammonium chloride or sulphate.

In the case of chrome extract or spent liquor, the material is diluted 50 to 100 times and a 5 ml. sample is evaporated to dryness in a porcelain crucible with precautions against spurting. The residue is covered with 0.5 to 1.5 gm. of potassium nitrate and heated to fusion temperature until the colour is uniformly yellow (this should take a few minutes only in a very hot muffle furnace). After cooling, the contents are dissolved in 4 to 5 ml. water while heating on a sand bath, the solution is transferred with rinsing into a small beaker and the nitrite is destroyed by application of either the urea or the ammonium salt method. In the former case, the solution is thoroughly mixed with 0.5 to 0.8 gm. urea and 3 to 4 ml. sulphuric acid, followed by cooling. In the latter case, the dry ammonium salt is added in such quantity that a saturated solution is formed, and the solution boiled for 5 to 6 minutes or as long as bubbles of nitrogen continue to come off (it may be necessary to add a little more water during the process to make up for the loss by evaporation). Finally, 3 to 4 ml. sulphuric acid are added to the still warm solution.

Must Avoid Exposure

To the cooled solution obtained after removal of nitrite are added 2 ml. potassium iodide solution and the beaker is covered with a watch glass for 5 minutes prior to titration of the liberated iodine with 0.01 N thiosulphate solution. Exposure to bright light should be avoided during this stage. The number of grams of CrO_3 per litre of the original solution is equal to:

$$2.53 \times A \times V_1/V_2$$

where A is the degree of dilution of the solution (this is unity when spent liquor is being analysed), V_1 is the volume of thiosulphate, and V_2 is the volume of the analysed sample. Total time required is 10 to 30 minutes.

Chrome-tanned leather is analysed by the following procedure: 0.02 to 0.05 gm. is ashed in the presence of 0.5 to 1.5 gm. of potassium nitrate, the operation being completed by intensifying the heating until the mass has a uniform yellow colour. The cooled mass is extracted with 3 to 4 ml. water, the solution transferred with rinsing to a small beaker or conical flask, and nitrate destroyed by either of the methods detailed above. The cooled solution is then acidified with 3 to 4 ml. sulphuric acid and the iodometric determination is performed as above. The chromium content is calculated from the expression:—

$$\%\text{age } Cr_2O_3 = \frac{0.0253 \times \text{ml. thiosulphate solution}}{\text{weight of sample}}$$

* Kulberg, Chaikovsky, and Alterzon, *Legkaya Promyshlennost*, March 1951, p.40.

Canadian Production Record

PRODUCTION of Canada's chemical and allied products industries in 1950 was the highest attained in any peacetime year, according to preliminary summary statistics compiled by the Dominion Bureau of Statistics. The year's value amounted to $635,986,000 as compared with $587,398,000 in 1949, a gain of 8.3 per cent. Since 1939, the value has risen four-fold, and since the index of wholesale prices for chemicals and allied products has advanced about 57 per cent in the 11-year period, from 100.3 to 157.1 in 1950, it appears that the physical volume of output was nearly two and a half times that of 1939.

There were 1,019 plants in operation during the year, and exports of chemicals and allied products increased substantially, being valued at $100,500,000—the highest for any year except 1945. Gains were recorded for acids, pharmaceuticals, paints, explosives, inorganic chemicals and for miscellaneous chemicals and chemical products, but declines were shown for fertilisers, soaps and toilet preparations. About 58 per cent of export shipments were to the U.S. and 6 per cent to Britain.

Imports during the year rose about 21 per cent to $158,200,000 of which nearly 85 per cent came from the United States and 9 per cent from Britain.

British Instruments on Show

Designs & Developments to be Seen at Olympia

LATEST trends in British equipment will be seen at the first exhibition devoted exclusively to the British Instrument industry which opens at Olympia, London, on Tuesday next, 4 July.

Over 150 leading manufacturers are taking part in a display which will be of interest to instrument users in industry, medicine, and education.

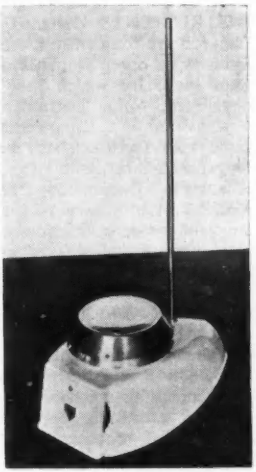
MANY new items and much re-designed apparatus will be shown by BAIRD & TATLOCK (LONDON), LTD., on the composite SCIEX stand. Exhibits will be grouped under four main headings: general chemistry; pathology, bacteriology and allied sciences; industrial equipment, such as coal and oil testing equipment, gas analysis apparatus and metallurgical testing apparatus; instruments and apparatus designed for special purposes.

In the general chemistry section will be seen the magnet stirrer/hotplate, a recent B.T.L. development now on the market for the first time. The unit consists of a cast base of light metal alloy to which is fitted a stainless steel retort rod and the hotplate. The casting houses a motor for driving a powerful permanent magnet, speed of rotation being controlled by a rheostat and the hotplate controlled by an energy regulator, a pilot lamp indicating when this is energised. The stirrer itself consists of a small length of magnetic material completely sealed in glass so that the metal does not come in contact with the liquid which is being agitated.

Other exhibits will include the latest range of aperiodic projection and analytical precision balances, centrifuges, water distillation apparatus, wide range ovens, potentiometric titration apparatus, aend a range of volumetric and sintered glassware.

Industrial equipment will include the new bomb calorimeter embodying several improvements in design, and a re-designed Redwood viscometer and oil testing centrifuge.

A new development in the special equipment is the B.T.L. electrographic-spot test apparatus for metals intended for sorting and checking of metals in workshops and stores. Two types will be shown, one for the laboratory and one a pocket model. Other important exhibits in this section will be the continuous flow absorptiometers (types A and B).—*Stand No.* 4, *Row H.*



The B.T.L. magnetic stirrer and hotplate which will be on view at Olympia

BETA-RAY thickness or weight gauges, both industrial and laboratory models, will form some of the main exhibits among the general laboratory and industrial group of instruments shown by the BALDWIN INSTRUMENT CO., LTD. In the 'Atomat' industrial model a radioactive isotope with a useful life of four years is used, with an ionisation chamber operating an indicating instrument calibrated in units of thickness of weight, and another showing deviation from a preset quantity. It may be used with paper, board, plastics, metal foil and so on, and is now being extensively applied to industry.

Other items include an improved gamma radiation detector (type P.P.) with a halogen quenched Geiger tube, widely used for prospecting for radioactive ores; a mains resistance meter which has special application to X-ray engineering and to welding; and the N.P.L. moisture meter.

For convenience the remaining exhibits

are divided into two further groups, one covering instruments for measuring X-rays and other ionising radiations, and the other photometric instruments and amplifiers.—*Stand No.* 83.

* * *

INSTRUMENTS designed for specialised research are frequently found applications in industry or other branches of research other than those for which they were originally developed. Some instruments of this type, now available for marketing by any interested manufacturers, will be shown by the DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH. Instruments from the Chemical Research Laboratory will be an automatic constant volume fraction collector to collect constant volumes of any liquid, independent of its characteristics, and a pressure controlled thermostat, the principle of which is here applied to the study of the corrosion of steel.

About 30 instruments will be displayed by the DSIR and industrial research associations including mechanical, optical, hydraulic, and electronic apparatus designed to meet special requirements.—*Stand C.5.*

* * *

EQUIPMENT to cover all aspects of high vacuum engineering will be demonstrated by W. EDWARDS & CO. (LONDON), LTD. Basic requirements for this technique are, of course, pumps for the production, and gauges for the measurement, of vacuum. Among the company's new items will be a special self-fractionating oil diffusion pump (F.203), reaching better than 5×10^{7} mm. of mercury. An inexpensive gauge which has proved popular for industrial and laboratory applications will be exemplified in the model B.2, battery thermal (Pirani type) gauge. This has a pressure range of 0.5 to 0.001 mm. of mercury and incorporates facilities for leak detection, employing the hydrogen technique.

Designed in consultation with the British Non-Ferrous Metals Research Association, the light alloy melt gas content tester which will be on view, provides an excellent example of the way in which vacuum technique helps industry. When casting light alloys the quality of the casting frequently suffers because of the amount of gas contained in the melt. This Edwards tester offers a quick and easy method of ascertaining the quantity of this gas before casting is begun, thus allowing for its reduction.—*Stand No.* 4, *Row H.*

MEASURING instruments covering a wide range of applications will be featured on the stand of ELECTRONIC INSTRUMENTS, LTD. One of the principal exhibits will be centred round the company's range of *p*H meters, including a battery portable type (model 30), a direct reacting type (model 23), and an industrial *p*H transmitter (model 28). Part of the display will consist of a continuous stream of water, the *p*H of which can be varied at will and the result observed on an outsize indicator.

An outstanding instrument to be seen among the valve voltmeters will be laboratory valve voltmeter, model 26. It covers from 0.1 v. to 250 v. on d.c. and a.c. and a 6 in. meter fitted with a mirror scale enables small changes in readings to be appreciated. On all the d.c. and low frequency a.c. voltage ranges the accuracy conforms to B.S. 89:1937 for first grade moving coil meters—a performance which has not hitherto been claimed for a mains-operated valve voltmeter.

A new exhibit will be the Minerva smoke detector which depends for its action upon the absorption of alpha-radiation by smoke particles.—*Stand No.* 92.

* * *

AUTOMATIC control equipment of robust design especially for industrial as distinct from laboratory use will be displayed by ELCONTROL, LTD. Exhibits will include liquid level control, furnace safeguard equipment, process and weld timers, and photo-electric apparatus.—*Stand No.* 129.

* * *

THE fact that the British Instruments Exhibition is being held during the Festival of Britain has enabled an interesting contrast to be made between the modern instruments which will be displayed by ELLIOTT BROTHERS (LONDON), LTD., and those shown at the Great Exhibition of 1851, at which Elliott & Sons, as the firm was then styled, showed instruments as new at that time as the latest exhibits are to-day.

In addition to its wide range of electrical measuring instruments, remote indication and control equipment, apparatus for process control, etc., the organisation is now associated with the Fisher Governor Co., Ltd., of which the level controllers, diaphragm motor valves and other specialities complete the equipment for automatic process control.—*Stand No.* 6, *Row G.*

An example of Elliott precision instruments—a reflecting dynamometer wattmeter

TEMPERATURE measurement and control and introscopes for internal examinations will be shown by the FOSTER INSTRUMENT CO., LTD. Exhibits will include single and multi-point temperature indicators and recorders, for use with both thermocouple and resistance thermometer elements; automatic temperature controllers; optical and radiation pyrometers for temperatures up to 3,000°C.; portable potentiometer and pyrometer tester, and pyrometer testing furnace. The introscope range includes models for examination of bores from ¼ in. diameter, to large models which can operate to a depth of 30 ft.—*Stand No.* 8, *Row E.*

* * *

DEMONSTRATIONS of its magnetic sorting bridge and of the G.E.C. photo-electric photometer and colorimeter will be given by the GENERAL ELECTRIC CO., LTD., which will also be showing a wide range of indicating instruments in the form of voltmeters, ammeters, wattmeters, power factor and frequency meters and synchroscopes in all grades and sizes.

Apparatus for use in connection with radioactivity will be represented by the Alpha hand monitor used for the detection of radioactive contamination of personnel and optical instruments will be covered by the precision densitometer of SALFORD ELECTRICAL INSTRUMENTS, LTD.—*Stand No.* 3, *Row G.*

* * *

LATEST technical refinements in laboratory apparatus will be on view at the stand of A. GALLENKAMP & CO., LTD. The display will cover electrical apparatus including drying ovens, centrifuges, incubators, muffle furnaces, stirrers, Kjeldahl nitrogen apparatus, etc.; 'Technico' volumetric glassware; A.G. sintered filtration apparatus and A.G. standard joint glassware.—*Stand No.* 2, *Row B.*

* * *

PIONEERS in laboratory apparatus since 1826, GRIFFIN & TATLOCK, LTD., will be showing a selection of instruments and apparatus covering a wide range of chemical laboratory operations, including pulverising, stirring, shaking, drying, sterilising, gas and fuel analysis, metallurgical examinations, etc. Many of the designs are new or with modern modifications.—*Stand No.* 4F.

* * *

TO keep a balance between its more everyday products and those of which the application is more often to be found in advanced research and control laboratories has been the object of the display by the Hilger division of HILGER & WATTS, LTD. For the routine work of the chemical laboratory will be seen polarimeters, refractometers and photo-electric absorptiometers. The latest model Spekker absorptiometer is capable of great accuracy of measurement and has a scale of densities (optical) which is effectively uniform and some 16 in. in total length.

Spectrographic equipment is perhaps the best known of Hilger manufactures. Two examples of quartz spectrographs will be shown: the medium quartz spectrograph widely employed for the routine analysis of non-ferrous metals and alloys, and the fully automatic large quartz and glass prism spectrograph. The latter has proved a valuable dollar earner in the U.S.A., where it is evidently highly prized.—*Stand No.* 4, *Row H.*

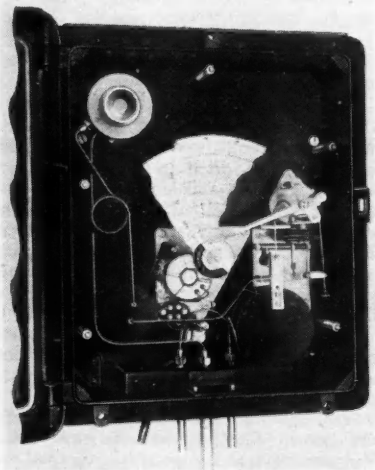
* * *

NEW equipment among the electro-chemical instruments to be exhibited by MULLARD, LTD., will include an electronic polarograph. This is an improved type in which the current to a dropping mercury electrode is con-

tinuously measured by electronic means. Display on a cathode-ray tube screen allows measurements to be made rapidly and an accuracy of 0.01 microamps can be achieved. Other exhibits having many applications in chemical processing will be an electronic temperature controller and the Mullard conductivity bridge and conductivity controller. —*Stand No.* 4, *Row D.*

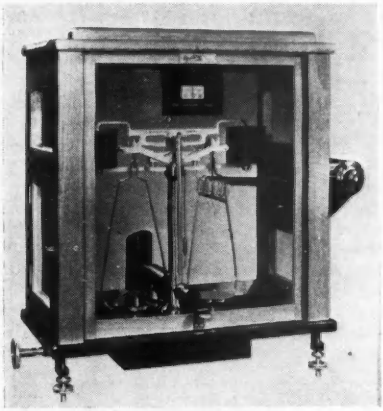
* * *

A SERVO-OPERATED positioning mechanism for indicating, recording and controlling low pressures down to 0.2 in. water gauge will be featured among the pressure, differential, draught and contents gauges to be shown by NEGRETTI & ZAMBRA, LTD. Another new item will be a micro-dial aneroid reading to .001 in. of mercury.—*Stand No.* 7, *Row G.*



Negretti and Zambra servo-operated positioning mechanism

LATEST developments in chemical balances and in microchemical assay instruments will be displayed by L. OERTLING, LTD. Chemical balance 62FM is designed for speed of operation. The automatic weight-loading gives finger-tip control of fractional weights; efficient damping minimises the time of swinging, and the optical system gives fast, accurate readings to four places of decimals. The instrument is fitted with corundum planes. In the microchemical



Chemical balance (model 62 F.M.) shown by L. Oertling, Ltd.

balances, models 141 and 142 incorporate the 5 in. nickel chromium alloy beam, an improvement pioneered by Oertling. Recent advances in design have been incorporated in two new aperiodic prismatic reflecting assay balances (models 161 and 162). Special points are the efficient air damping system which quickly brings the balance to rest, and the optically projected scale.—*Stand No.* 61.

* * *

INTERCHANGEABLE laboratory glassware will be demonstrated by QUICKFIT & QUARTZ. The versatility of the scheme will be shown in a utility set of 18 pieces from which 14 different assemblies can be made up. New equipment will include a semi-micro molecular still; spinning band fractionating still; climbing film evaporation unit; and the latest designs of Sochlet extractors. A 1/12-scale model of a sulphuric acid absorption plant will indicate the scope of glass units for large plant. This absorption tower is capable of producing 20 tons of pure acid a week.—*Stand No.* 12*E.*

* * *

BALANCES to cover every need of research, industrial and educational laboratories will be shown by STANTON INSTRUMENTS, LTD. On view for the first time will be the new features and improvements incorporated in the firm's aperiodic balances, notably the re-designed weight-loading attachment. A newly developed precision

limit balance having a wide range of applications in industrial control work will also be exhibited.—*Stand No.* 130.

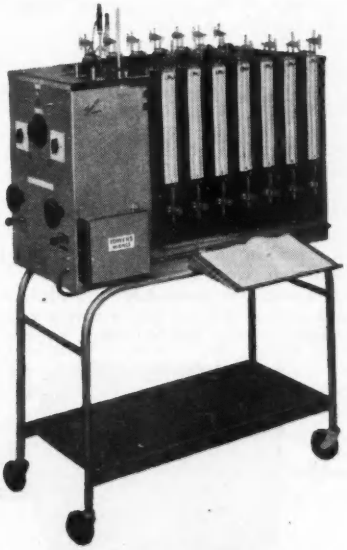
* * *

DEMONSTRATIONS to illustrate some of the uses of its equipment in research and industry will be given by SUNVIC CONTROLS, LTD. Exhibits will include a creep test control panel; strip chart recorder; a radiation pyrometer; and cold junction thermostat. —*Stand No. 5E.*

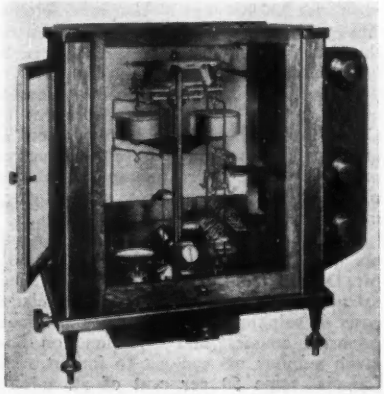
* * *

A WIDE range of interesting apparatus will be shown by J. W. TOWERS & CO., LTD. A rotating weight balance (model No. 7), has been produced for weighing large samples in the laboratory. It will weigh up to 6 kilos with an accuracy of 0.5 grm. The novel rotating weights arrangement covers the range 0-1000 grm. and each division on the weight is 0.5 grm.

The Warburg apparatus for the measurement of cell respiration and similar processes is of growing importance, and the company's new model is therefore of considerable interest. The large constant temperature bath is of stainless steel and is thermostatically controlled at the desired temperature within 0.05° C. To maintain even temperature throughout the bath, the water is circulated by means of a centrifugal pump driven by a quiet-running ¼ h.p. induction motor. Water is drawn from the bottom corners of the bath and returned through a perforated tube placed along the middle and just below the surface of the water. The motor also drives the shaking panels carrying seven manometers, one on each side of the bath. They are independently controlled and the speed of shaking may be varied from 50 to 120 oscillations per minute, and the length of stroke from 0-3 inches.



New model of the Warburg apparatus shown by J. W. Towers & Co., Ltd.



A popular balance, auto-loading (model B.A.6) one of the exhibits of Stanton Instruments, Ltd.

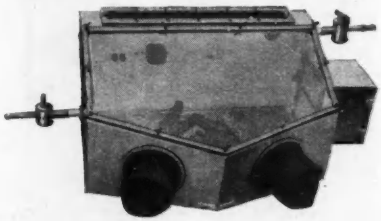
For micro dissection and cell division the Towers micro manipulator has been designed, and the aim has been to combine simplicity of construction, adequate sensitivity and reasonable cost. The primary movement consisting of greased concave and convex ground faces is particularly interesting and simple. The secondary movements are by vernier screws.

The Universal Incubator is of dual purpose design, for use as an incubator 30-45° C. ± 0.5° C. or, by removing the glass door, it is suitable for use as a drying oven up to 110° C. ± 1° C. The inner oven is of aluminium.

Towers Thermostat Unit is a combined heater-stirrer unit for fitting to any small bath, and enabling any desired temperature

up to 100° C. to be maintained ± 0.1° C., or finer under suitable conditions. In operation, water is drawn in at the bottom of the stainless steel tube, passed over the heating elements and discharged at the top of the bath. Very efficient circulation is achieved. Two 500 watt elements and a 1/75th h.p. electric motor are fitted. The separate control unit contains relay for thermostat, stirrer speed control, heater and mains switches and pilot lamp.

The Towers magnetic stirrer enables liquids to be stirred in closed systems, where, for example, gas changes have to be observed, as in hydrogenations: moisture and air must be excluded, as in certain special titrations: high vacuum or pressure must be maintained, etc. It utilises a rotating magnetic field to induce a vigorous rotary movement in a small magnetised bar totally enclosed in a glass or polythene tube and placed in the liquid to be stirred. The 1/60th h.p. electric motor is housed in a cast aluminium case and provided with speed control rheostat which covers a range of approximately 100-200 r.p.m.



Towers manipulator box

The Towers Manipulator Box is a device in which chemical operations may be carried out under perfectly dry conditions and in any desired atmosphere, e.g., nitrogen, rare gas, etc. It was originally developed for handling radio-active materials in a controlled atmosphere for example, α-active and/or β-active substances. It reduces to a minimum the health hazard associated with the handling of such materials and provides a safe and convenient means of carrying out otherwise hazardous radio-chemical reactions and operations.

J. W. Towers & Co., are distributors of Quickfit apparatus and the Lablox exhibit carries various Quickfit assemblies. Among the other apparatus exhibited are—high vacuum pumping units and distillation units, new types of isomantles for beakers and funnels, electric furnaces, volumetric glassware, hydrometers, shaking machines, electric hot plates, thermostat baths, autoclaves, etc.

The exhibition, which will be open daily (except Sunday) until 14 July, is being staged with the patronage and active support of: The British Electrical & Allied Manufacturers' Association; The British Lampblown Scientific Glassware Manufacturers' Association; The Drawing Office Material Manufacturers' and Dealers' Association; and The Scientific Instrument Manufacturers' Association of Great Britain, Ltd.

Canadian Sulphur Programme

A DECLINE in sulphur reserves in the United States may engender a huge development programme in Canada. J. R. Donald, Montreal chemicals director of the Defence Production Department, said in an interview that industry will spend about $11,000,000 in capital investment this year to explore the possibilities of increased Canadian production, and by 1952, he estimated, the programme should start taking effect, with beneficial results to Canada's industry, employment, and reserves of dollars. Her dependence on U.S. supplies is expected to decrease and industry may reduce imports.

The United States supplied Canada last year with 390,000 tons of elemental sulphur. This year, Canada needs 415,000 tons from the U.S., in addition to the 311,000 tons she expects to produce herself. Nearly all this 415,000 tons is expected to be allocated mostly because the U.S. is dependent on Canadian newsprint—about 90 per cent of all Canadian newsprint goes to the American market. Three alternative sources of supply of sulphur are available; smelter gases, iron pyrites, and natural gas in Alberta.

'Potential sources of sulphur in Canada are large in the form of iron pyrites', said Mr. Donald, 'and other sulphide ores. Their extended use depends only on the relative costs of sulphur from this source and from imported sources, and of course on how much sulphur we can get to import. In Canada, some 50 per cent of all sulphur consumed is used by the pulp and paper industry, and elemental sulphur imported some 75 per cent is used by this industry'.

Synthetic Organic Insecticides

Their Values and Limitations

AT the International Agricultural Conference held at Fernhurst, Surrey, on 26, 27 and 28 June, J. H. Stapley read a paper on the value and limitations of synthetic organic insecticides, of which the following is an extract:—

Modern insecticides such as B.H.C., D.D.T. and the organophosphorus compounds are unquestionably an advance on the older materials such as lead arsenate, nicotine, derris, hydrogen cyanide and many others. The principal reasons for this are:—

1. Very much higher insecticidal activity at economic dosages.
2. Chemical stability and thereby persistant properties.
3. Standardisation, i.e., freedom from the variability of natural products.

D.D.T.

D.D.T. is primarily used where good foliage persistence is required as in the case of pea moth and carrot fly control. It is also valuable where B.H.C. cannot be employed owing to the hazard of taint, for example, on potatoes. D.D.T. is principally a foliage insecticide for both tree and field crops. It is relatively slow in action and, as a rule, is not employed when quick contact action is required. D.D.T. appears to be of little use as a soil insecticide probably because its low volatility renders action in the soil too slow.

Benzene Hexachloride

Benzene hexachloride has achieved its main success as a soil insecticide principally against wireworms. This is undoubtedly on account of it possessing a certain volatility which D.D.T. lacks. B.H.C. is also one of the few compounds which has proved valuable against termites. More recently B.H.C. has come to be used as a foliage insecticide on tree fruits because of its value against fruit aphids, especially woolly aphid, and fruit sawflies, especially apple and plum sawflies. B.H.C. appears capable of controlling a wider range of pests than D.D.T., and when commercial supplies of products based on the gamma isomer are more readily available, the potential role of D.D.T. may be considerably reduced.

Benzene hexachloride and its gamma isomer possess many interesting properties which are valuable for insect control. For example, B.H.C. is ovicidal to many insect eggs, as in the control of cabbage root fly and carrot fly. It is also absorbed into plant tissues. If used in the correct type of formulation it can be used to control leaf miners. Perhaps the most important property of the B.H.C. is its potency against the age-old pest of man—the locust. So potent is B.H.C. to locusts that it has been stated that as little as 3 grams of gamma-B.H.C. is capable of killing 1½ million locusts, weighing about one ton.

Parathion

Parathion is probably the most important of the new synthetic phosphorus compounds which originated in Germany. The possession of pronounced acaricidal properties suggests that the value of these phosphorus compounds may outstrip that of other chlorinated hydrocarbons. They are, however, far more toxic to warm-blooded animals than the chlorinated hydrocarbons and this constitutes their principal disadvantage.

The first organic phosphorus compound to be used commercially was the so-called HETP. Its use gradually receded with the increasing availability of parathion, but experience has shown that HETP, which is really a dilute form of TEPP, has certain definite uses for which parathion is unsuitable.

It does not seem to be generally appreciated that TEPP is much more toxic in concentrated form than parathion. Although parathion has been taken up with great reluctance by the grower, in fact, it possesses several advantages over TEPP, viz., it is capable of penetrating and acting through plant tissues. It may be mixed in alkaline solutions such as Bordeaux mixture and lime sulphur. This fact enables it to be used in combined insecticidal and fungicidal sprays on fruit and other crops. It is used at much greater dilutions in the final spray. And it can be formulated as a dust.

The principal value of parathion (and to some extent TEPP) lies in its high acaricidal properties, being extremely toxic to plant feeding mites of the red spider type. It has, therefore, been the policy in this country to reserve parathion for application to crops in which red spider is the dominant problem. It is also extremely toxic to aphids at as low as 1 : 100,000, but it is non-ovicidal. Neither is it persistent longer than three days after application as a rule.

While certain insects like the Colorado beetle are scarcely affected by normal concentrations of parathion, it is very interesting to find that certain eelworms are susceptible. Reports that the chrysanthemum eelworm can be controlled by sprays containing 1 : 4,000 parathion have been substantiated, and two sprayings give satisfactory commercial control. The parathion is actually toxic to this eelworm at 1 : 100,000 concentration.

Limitations

The widespread use of these and other synthetic insecticides, however, has raised a new set of problems for the entomologist. These can best be considered under the following headings:—

1. Effects on beneficial insects, and the upsetting of the balance of nature.
2. Effects on plants and soil.
3. Effects on warm-blooded animals.

D.D.T.

In Great Britain there is good evidence that application of D.D.T. sprays to apples and plums after blossoming leads to an immediate increase in red spiders. The increase is not gradual as might be supposed but immediate and of considerable magnitude, even with pre-blossom sprays. It is known that certain non-contact insecticides such as lead arsenate can bring about an increase in *Paratetranychus*. This fact, sometimes overlooked, suggests that some mechanism apart from destruction of beneficial insects, may be playing a part, for instance, the possibility of stimulatory action on the reproductive processes of *Paratetranuchus*.

D.D.T. is also highly toxic to certain parasites of the pea moth but no ill consequences have been reported as D.D.T. gives a satisfactory control of this pest. On the other hand D.D.T. is valueless against cabbage root fly. This is undoubtedly due to the destruction of insect parasites or predators in the soil.

B.H.C.

The principal charge against benzene hexachloride lies not so much in the killing of parasitic insects but in the destruction of pollinating insects, especially hive bees. D.D.T. does not appear to be particularly toxic to bees. In the field, however, B.H.C. has proved less injurious to fruit-pollinating insects than might have been expected largely because recommendations for its use are designed to avoid application near to blossoming.

Avoidance of possible destruction to pollinating insects depends not only on correct timing of the application but also in the use of the correct formulations. Liquids are to be preferred to dusts because the latter, though perhaps more suitable for the treatment of seed crops, leave residues which are readily picked up by hairy insects like bees. Liquid formulations of the same insecticide dry out on the plant and are less liable to come into contact with visiting pollinators.

B.H.C. soil treatments undoubtedly kill many predacious insects such as ground beetles (*Carabidæ*) and their larvæ, but no ill effects have been reported. It is probable that soil predators subsist principally upon springtails (*Collembole*) and other species present in the soil in large numbers and feed less upon insect pests such as wireworms and chafer larvæ.

B.H.C. has little effect on earthworms, whereas some of the older insecticides are extremely toxic to them. Fruit growers in Great Britain have for many years used three potent wormkillers, viz., tar oil (and kindred winter washes), derris and lead arsenate.

Parathion

At present little guidance can be given as to the place parathion occupies in the list of compounds destructive to beneficial insects. Parathion is potentially less likely to be detrimental because its persistence is less than that of either D.D.T. or B.H.C. Destruction of beneficial insects by direct contact action is undoubtedly as great by parathion as with D.D.T. and B.H.C. Parathion, however, is more toxic to a wider range of pests and so tends to offset this disadvantage.

Effects on Plants and Soil

In Great Britain D.D.T. has always been regarded as an insecticide which could be used on plants at normal strengths without fear of damage so long as it was clearly remembered that members of the *Cucurbitaceae* were excluded from treatment. Damage caused by D.D.T., where reported, has nearly always been traceable to some other ingredient in the product, usually the solvent in emulsions. Wettable powders and dusts are generally quite safe. In the soil, D.D.T. disappears very slowly.

B.H.C.

On the other hand considerable experience exists concerning the use of B.H.C. as a soil insecticide. There is little doubt that it remains in the soil for many months after application but disappears more quickly than D.D.T.

Many experiments in Great Britain on the tainting of crops by B.H.C. have clearly defined the position, which may be stated as follows:—

1. Crops that taint readily—potatoes, blackcurrants, grapes.
2. Crops that taint by direct application of B.H.C. in large doses—carrots, beetroot, peas, onions.
3. Crops that sometimes taint by application of B.H.C. near to harvest—asparagus, cauliflower, celeriac, kale, kohl-rabi, lettuce, marrow, raspberry.
4. Crops that appear without reaction to B.H.C.—apples, broad beans, brussels sprouts, celery, cucumber, parsnips, strawberries, radish, sugar beet, swedes, tomatoes, turnips, wheat.

The main answer to the problem of taint lies in the use of gamma-B.H.C. instead of B.H.C. mixed isomers. Gamma-B.H.C. is approximately 8 times as toxic as B.H.C. to wireworms, with a taint potential to potatoes of 5 times less than B.H.C. B.H.C. is less injurious to *Cucurbitaceae* than is D.D.T. The gamma isomer, in most circumstances, is perfectly safe.

Parathion

Parathion is normally applied in sprays at very high dilutions. At such dilutions it appears to be safe on all types of plants.

The effect of parathion on the fauna and flora of the soil remains to be worked out. At present it would seem that only at high rates, amounting to 100 lb. per acre, is normal growth prevented.

TEPP is far more phytotoxic to plants than parathion.

Effects on Warm-Blooded Animals

This is a large subject which is really outside the scope of this paper. The toxic hazards presented by any insecticide are of fundamental importance. In Britain D.D.T. and B.H.C. are considered as safe insecticides for field use; parathion and the organic phosphorus compounds are dangerous. A series of precautions has been drawn up by a Working Party set up by the British Ministry of Agriculture which should enable these substances to be used with complete safety.

The Future

The discovery of so many powerful insecticides and acaricides in recent years has led to the bewilderment of the grower and placed a heavy responsibility upon the research worker. New compounds should replace established insecticides slowly and only after adequate trial. Any tendency to rush new alternative compounds on to the market should be resisted.

Research workers would now be well advised to turn their attention more to techniques rather than to the discovery of chemical compounds of higher insecticidal activity. What is required now for the solution of many unsolved problems and for the cheapening of known solutions is the discovery of suitable techniques of application.

Among these newer techniques is the use of systematic insecticides which are not directly toxic on contact with insects, but become so when introduced into and translocated by the sap stream of the host plant. It is probable that great strides will be taken in this direction as newer and safer chemical types are revealed by further work.

There have been suggestions that such chemicals may only become insecticidal after chemical change within the host plant. Perhaps we shall have to search for new products that can be transmuted within plant tissues.

Finally, it has recently been demonstrated that antibiotics can act as fungicides. Is it too far outside the bounds of possibility that new leads in the insecticidal field may be found among the metabolic products of other living organisms?

Chemical Weed Control

AT the Agricultural Conference Dr. W. Templeman read a paper on chemical weed control, of which the following is an extract:—

At various times it has been stated that weeds reduce the yields of the world's crops more than all other plant pests put together. If this is correct it is not surprising that chemicals have been used as herbicides for a long time, but it is also true that some of the greatest progress has been made in the last ten years. The understanding of the chemical constitution of natural plant growth regulators and the production of synthetic types has paved the way for the discovery of hormone weedkillers.

The most used chemicals in Europe in 1937 were sulphuric acid, copper sulphate, kainite and calcium cyanamide for cereals and sodium chlorate and arsenicals for non-selective weed control. In America borax and oils were in use. In the same year trials on cereals with dinitro-*o*-cresol and copper chloride were undertaken in Britain.

'Methoxone' Discovered

At Jealott's hill in 1940 it was shown that α-naphthylacetic acid in suitable doses killed yellow charlock in oats and this led to the discovery in 1941 of Methoxone (2-methyl-4-chlorophenoxyacetic acid, or MCPA) and, in 1942, of 2,4-D (2,4-dichlorophenoxyacetic acid). In the same year the Boyce Thompson Institute described 2,4-D as a potent growth regulator, and its herbicidal properties were later discovered independently. 2,4,5-T (2,4,5-trichlorophenoxyacetic acid) has also been shown to kill woody weeds and shrubs, and inorganic and amine salts and esters of these compounds are now widely used.

Grasses are relatively resistant to the substituted phenoxyacetic acids at the low dosages normally employed. Isopropyl phenyl carbamate (IPPC) discovered at Jealott's Hill in 1941 is toxic to grass seedlings at rates that do not harm many other plant species. Unfortunately deep rooted perennial grasses are not affected.

Other important developments in recent years are the use of dinitro-*sec*-butyl-phenol (DNBP) as a selective weedkiller in lucerne and clover, the use of oils in umbelliferous crops, and the application of pentachlorophenol as a pre-emergence herbicide. Cyanates have been proposed for weed control in onions and trichloracetic acid for grass killing.

For specific purposes ammonium sulphamate, methyl bromide, phenylmercuriacetate and sodium isopropyl xanthate have also been used. Many other compounds have been examined to a limited extent and there is no reason to expect a fall in the number of new experimental weedkillers coming forward.

Hormone Weedkillers

In this paper certain aspects of the practical use and general principles of hormone weedkillers will be discussed. For instances, how does 'Methoxone' compare with 2,4-D and why are American recommendation on the same weeds lower than British?

Concentrated solutions of 'Methoxone' sodium salt are available commercially for low and high volume spraying but because of the low solubility of sodium 2,4-D, it is used as an amine or ester formulation. There appears to be little difference in herbicidal properties when corresponding derivatives are compared, but recent work has shown that heavy doses of esters of 'Methoxone' are less damaging to cereal crops than 2,4-D esters. Legumes and linseed are also less damaged by 'Methoxone'. Furthermore, it has been shown that 2,4-D has greater potency for the induction of formative effects. There is, however, a complex relationship between stage of growth and other factors, and susceptibility to any weedkiller.

Formulation Important

The phytotoxicity of 2,4-D increases from the acid and sodium salt to the amine and ester, but the effect of formulation must not be overlooked. Comparisons between different esters without common adjuvants may be misleading. However, trials with pure chemicals are of less value to the user than experiments with commercial preparations.

Because weeds differ in their susceptibilities, mixed weedkillers may be useful. Although mixture of oil, PCP and a 2,4-D ester are used in sugar cane crops, translocated and hormone weedkillers are generally more efficient if applied to tissues that remain undamaged.

Where the herbicides are applied to the soil before crop emergence, mixtures may be more successful—*e.g.*, combinations of 'Methoxone' or 2,4-D and IPPC. Several years' trials at Jealott's Hill and elsewhere have shown that if these are applied 3 to 4 weeks before sowing kale, mangolds, sugar beet and lucerne, little crop damage results and good control of susceptible weeds is achieved.

Resistant strains of normally susceptible weeds are not yet evident as a result of chemical weed control, but Blackman has proposed a rotation of weedkillers as the continuous use of any any one, while removing susceptible species, may encourage resistant types.

Mixing of herbicides with fertilisers has been suggested, as requirements can be estimated in advance, labour is saved and such a mixture might be cheaper. However, the dosage rates of the two products are linked, ideal application times may not coincide, and fertilisers are generally applied as dusts, while weedkillers give best results as sprays.

Soil Applications

Why are American recommendations for hormone weedkillers lower than British? In North America, amine salts of 2,4-D are sprayed on cereals at rates between 3½ and 10 oz. acid per acre, with esters between 3 and 8 oz. In Britain *sodium salts* of 2,4-D and 'Methoxone' are recommended at 12 to 32 oz. per acre. The divergence is partly due to the use of different derivatives.

Climatic conditions also vary but no special recommendations are made for the Western coastal States of U.S.A., whose climate is somewhat similar to that of the British Isles. British farmers expect 95-100 per cent killing of weeds, but research may show that a reduction of weed growth may be more profitable than eradication.

The weed problems in perennial crops may be solved by developments of the observation, by King and Lambrech, that sodium 2,4-dichlorophenoxyethyl sulphate, although not phytotoxic when sprayed on aerial growth, has a very marked effect when applied to the soil where plants are growing. Possibly crops whose seeds are sown or whose roots penetrate deeply may be resistant to this type of weedkiller, while surface germinating weeds are killed.

Concerning future development, it is certain that as the knowledge of agronomists and physiologists increases, logical theories will replace *ad hoc* suggestions, new uses for existing herbicides will be found, and new weedkillers will emanate from the chemical industry.

Plant Virus Diseases

DR. K. M. Smith also spoke at Fernhurst on the subject of plant virus diseases. The following is an extract of his paper:—

In the Rede Lecture at Cambridge in 1938 the late Sir Patrick Laidlay suggested that the proper understanding of virus diseases was essential for the future well-being of mankind. During the thirteen years which have passed since that lecture, events have more than justified his remarks.

Added to the virus epidemics are the formidable losses caused by plant virus diseases. In this country over a million tons of potatoes are lost annually through this cause. In some parts it is impossible to grow cauliflowers or broccoli because of the incidence of two aphid-transmitted viruses and in East Anglia the sugar beet crop is grown under the ever-present threat of attack by virus yellows. Overseas it is just as bad.

Many plant viruses are dependent upon insects for their spread from one plant to another so that control is necessarily often an entomological problem also. This is made more difficult by the fact that only a few insects are necessary to cause a high percentage of infection.

In this short paper the various individual methods of approach to the problem of plant virus control are set out, together with the tests necessary in some cases for the detection of viruses which may be latent in crops but are nevertheless harmful.

It should be remembered that much control can be achieved by the application of good farming hygiene, by the use of inspection and field certification schemes, by the isolation whenever possible of a healthy susceptible crop from a nearby infected one and particularly by the choice of healthy virus-free material in the case of crops vegetatively propagated.

Starting With a Virus-Free Crop

The first essential in controlling virus diseases is to ensure that the material planted is virus-free. With most annual crops raised from seed this presents no

problem, for with a few important exceptions, viruses are not seed-borne. With vegetatively propagated plants, however, because of the ability of viruses to invade and persist in all the vegetative parts of plants, the conditions of planting material is all-important. All tubers, cuttings, rhizomes and bulbs give rise to virus-infected plants if the parent plant is virus-infected.

Virus-Free Plants

One method of tackling this problem is to build up a nucleus stock of virus-free plants which is kept, so far as possible, under virus-free conditions. From these nucleus stocks a constant supply of plants can be passed on to growers and others. Such a scheme is already in existence for seed potatoes where the basic stocks are propagated in glasshouses under insect-proof conditions. The second step is to multiply up the basic stocks out of doors in the best isolation from outside contamination obtainable; only out-of-doors is it possible to produce sufficient quantities of potatoes to be of practical advantage.

Some such scheme is urgently needed for other vegetatively propagated crops which are becoming heavily infected with viruses in much the same way as potatoes would if they were grown continuously in England.

There are various methods of building up a virus-free stock of plants. The preliminary step is to select apparently healthy and symptomless plants from the growing crop. This will avoid some of the more obvious and severe virus diseases, especially so far as dahlias are concerned, but it will not suffice for the more insidious viruses which show few or no symptoms or which may be carried entirely without symptoms. Examples of this are potato virus X and, in dahlias, cucumber mosaic virus which in some varieties such as Bishop of Llandaff is completely symptomless.

Viruses in carrier plants can be detected by two main methods: (a) by inoculation to indicator plants (b) by a specific antiserum.

An indicator plant is one which gives a rapid and characteristic response to a virus which may be symptomless in the crop plant.

The selection of a suitable indicator plant for a given virus is largely a matter of trial and error since a good reactor is frequently unrelated botanically to the crop plant under test. Recent work in Cambridge, for example, has shown that New Zealand spinach gives clear and unmistakable local lesions in response to inoculations from chrysanthemum plants infected with mosaic virus. Also, the virus remains isolated in the inoculated leaves so that several tests can be carried out on the one indicator plant. The other important way of detecting concealed viruses is by serological means, where the antiserum produced by a rabbit injected with the virus is isolated and applied to the plant. This antiserum reacts only with the specific virus and its related strains, and thus gives a quick and reliable method of recognition of a latent virus. The serological method avoids the delay of several days necessary for the development of lesions on the indicator plant but it is rather more difficult and requires an experienced operator.

Since so few viruses are carried in the seed it is easy enough, when the new crop is raised from seed, to start with a virus-free crop. The problem in this case which, of course, is also a problem in vegetatively propagated crops, is to stop the arrival of infection and its subsequent dispersal about the crop. This raises the question of dealing with the insect vectors of viruses.

Dealing With the Insect Vectors

(a) *Direct Attack on the Insects.* Up to the present no great success has been achieved by the direct application of insecticides against the insect vectors. This is partly because a very few insects can cause many infections and possibly partly because the application of chemicals may cause virus-bearing insects to move about more than they would otherwise do—an important factor.

In Australia, some degree of control of the thrips, the vector of the tomato spotted wilt virus, has been achieved by the use of a bait containing tartar emetic or alternatively by the use of D.D.T. These methods seem capable of reducing the loss if the infestation of thrips is only moderate but in a heavy infestation hundred per cent infectation of the plants will occur and it is not an economic proposition to spray frequently enough with D.D.T. The method of 'multiple planting' where three tomato plants are planted instead of one, has been used in combination with insecticides but there is some evidence that this method defeats its own ends by attracting large numbers of thrips by virtue of the greater number of plants.

In certain aphid-transmitted virus diseases,

notably sugar-beet yellows, the application of an aphicide has given good results. A common source of virus is the seed or 'mother' beet which overwinters and is frequently infected. Destruction of the aphids on these by repeated dusting or spraying with nicotine helps to reduce infection.

Possibly more success will be achieved by the systemic insecticides, as these are taken up by the plant and any insect feeding on it is killed. They are persistent, selective to the insects that feed on the plant, and they avoid the indiscriminate killing of harmful and beneficial insects alike which characterises ordinary insecticides.

Fumigation

It is, as would be expected, in confined spaces such as glasshouses that the best control of insect vectors has been achieved. Regular fumigation with nicotine and D.D.T. 'bombs' will keep down the number of aphids and thrips to a minimum and thus reduce the spread of the viruses of cucumber mosaic and tomato spotted wilt which are the two commonest viruses affecting glasshouse crops.

(b) *Avoiding the Insect Vector.* Sometimes the insect vectors of important viruses can be circumvented by careful selection of the site and time of planting. The growing of seed potatoes in areas like certain parts of Scotland or hot and dry situations in Africa where the aphids are scarce or absent is a good example of 'dodging' an insect vector. Early sowing of a susceptible crop so that the plants may be better able to withstand attack is sometimes feasible.

A more direct method of warding off insect vectors is practised in America. This consists of the use of screens or cloth cages and has been employed mostly against the leaf-hopper vector of aster yellows.

Muslin cages have also been used, however, to protect brassica seedlings against two aphid-borne viruses and it might be worth considering this method in parts of the United Kingdom where the cabbage black ring spot and cauliflower mosaic viruses are such a menace to the broccoli industry.

Experiments in Germany on the control of the beet leaf crinkle disease have shown that a 'trap crop' is a useful method. Strips of land adjoining the main crop are sown early with beet and as soon as the plants are infested with the Piesma bug which transmits the virus they are heavily sprayed and then ploughed under.

This is an important measure when it can be properly carried out but this is not always easy. So far as the potato crop is concerned there are two main sources of infection, the occurrence of infected plants in the parent stock, which emphasises the importance of starting with a virus-free crop, and the presence of volunteer potato plants, which are generally infected, from the previous year's crop. Similarly with sugar beet, much infection with mosaic and virus yellows comes from the seed crop, which is frequently grown in close proximity to the root crop. In addition, there are volunteer beets and mangolds, mangold clamps, and the biennial garden varieties such as red beet, seakale beet and perpetual spinach.

The virus of tobacco mosaic is mechanically transmitted and in this country it is a perennial source of loss to the tomato-growing industry. One source of infection is certainly through the medium of smoking or chewing tobacco which is frequently heavily infected with viable virus. But apart from this there is another source of infection which is usually overlooked. Tobacco mosaic virus is very stable and resistant and retains its infectivity for long periods; and it has recently been shown that virus contaminating the staging and wires of a glasshouse in drops of sap, etc., will remain infectious throughout the winter till the following season.

Spraying removes the virus, and thus shows the necessity of a thorough washing down of wires and staging after the tomato crop is removed. It should be remembered that a couple of tomato plants infected with tobacco mosaic virus at the beginning of the season are sufficient to infect the entire house of several thousand plants.

The Use of Virus-Resistant Plants

The production by the plant breeder of virus-resistant plants is rather long-range work but there are several examples of the control of plant virus diseases by this method—*viz.* curly-top-resistant sugar beets in the U.S.A. and the P.O.J. varieties of sugar cane resistant to mosaic.

Some plants such as *Nicotiana glutinosa* react to infection with tobacco mosaic virus by the formation of local lesions on the

infected leaf without further spread of the virus throughout the plant. The gene responsible for this factor of resistance has been transferred to the tobacco plant but more work is necessary before the control of the tobacco mosaic virus is in sight.

Paradoxically enough in breeding patotoes, to reduce losses from viruses the tendency is to aim for extreme susceptibility. This is known as 'field immunity' because the plant is killed outright by the virus which is itself destroyed in consequence, and so cannot spread.

Occasionally a potato variety is produced which is completely immune to a specific virus. Thus, the American seedling 41956 is immune to infection with potato virus X.

Since plants apparently do not develop antibodies there is no acquired immunity comparable to that which occurs in animals. The only type of acquired immunity in plants is of the non-sterile type where the presence of one virus in the tissues precludes entrance of any virus which is related to the first virus. This immunity is not complete but varies apparently according to the degree of relationship between the respective viruses.

Cure of Virus-Infected Plants

There are at present two methods of curing virus-infected plants which, however, are not generally applicable, (*a*) by heat treatment, (*b*) by chemicals. Kunkel in America was one of the first to eliminate viruses from infected plants by means of heat. He was successful in curing peach trees of yellows, little peach, red sature and rosette. The trees were kept at a temperature of 35°C. for about a fortnight.

Kunkel also carried out experiments on the heat treatment of asters infected with yellows; these were unsuccessful because the aster plants could not stand the heat. The virus, however, was successfully eliminated from another plant species (*Vinca rosea*) which could withstand two weeks in a hot room at 38°C.

Various attempts have been made to eliminate virus from potato tubers. These have been unsuccessful with virus X, but Kassanis has recently cured potatoes of the leaf-roll virus by keeping them in an incubator at 37.5°C. The period necessary to destroy the virus is rather long—25 days.

It is probable that the heat treatment could be applied successfully to other virus-infected plants. It would be worth trying, for example, whether dahlia tubers infected with tomato spotted wilt virus could not be cured, since this virus has such a low thermal inactivation point.

Very little work seems to have been done on the chemotherapy of plant viruses. Stoddard says that he cured buds from peach trees infected with 'X' disease by soaking them in water solutions of quinhydrone, urea and sodium thiosulphate. Locke has experimented with 0.2 per cent 2, 4-dichlorophenoxyacetic acid in the control of potato leaf-roll. He considers that the amount of virus is actually reduced by the treatment and that it is not a question of masking of symptoms. This chemical, however, is very damaging to the potato plant. Rumley and Thomas, in some recent work with carnation mosaic, have found that calcium chloride and zinc sulphate are effective against the mosaic virus *in vivo*. They found, however, that the toxic effect of the chemicals on the plants made the treatment of unrooted cuttings quite impractical.

Faster Analysis

A NEW 'mass-produced' analytical technique thought up by the Du Pont de Nemours company consists essentially of previously prepared small bottles containing an accurately determined amount of reagent sufficient for a single analysis, with indicator added. The top of the bottle is sealed with a rubber cap through which solutions are injected by hypodermic syringe—thus eliminating contact with air, and the amount of solution added is determined by weighing on a fast-weighing balance. Analyses can be carried out on only a few milligrams of solution, and by choosing different reagents, the determination of acid number, saponification number, hydroxyl, water, carbonyl or other groups may be done quickly and efficiently, say the company. Certainly the flat time of 4 minutes from start to finish of one analysis seems very good. The company uses the method for analysing nylon intermediates, anti-freeze, agricultural chemicals and other research samples and predicts it will eventually be used for on-the-spot checks and quick answers at various production locations. Research has been done, before the method was developed, on the stability of indicators in contact for long periods with various reagents.

Embargo on Exports

Ban Placed on Strategic Materials

ON the afternoon of 19 June the President of the Board of Trade, Sir Hartley Shawcross, made a statement in the House of Commons on Britain's trade with China, in which he announced that the Government had decided to impose export licence control on all goods to be sent from the U.K. to China and Hong Kong.

The list of goods for which no export licences will be granted include the following:—

Atomic energy materials and equipment.

Petroleum Products. Crude petroleum, refined petroleum products, naphtha, mineral spirits and solvents.

Metals and Minerals.

All classes of iron and steel products (including alloy steels) up to and including the finished stage and including barbed wire and steel wire strand and cable, iron and steel scrap.

Metals, the following and alloys wholly or mainly thereof including ferro-alloys and scrap: Aluminium, antimony, beryllium, bismuth, cadmium, calcium, cobalt, columbium, copper, lead, germanium, magnesium, molybdenum, nickel, sodium, strontium, tantalum, titanium, tungsten, vanadium, zinc and zirconium.

Items in the following fields:—

(i) Items used for the production of alloy steels.

(ii) Low melting-point alloys.

(iii) Metals (and their compounds) used in connection with petroleum warfare and military pyrotechnics.

(iv) Special abrasives for lens-grinding.

(v) Compounds constituting potential sources of metals listed under 5(b) above.

(d) Asbestos and asbestos yarn, textiles and clothing.

(e) Strategic grades of mica.

Rubber and Rubber Products

(a) Natural rubber (including latex and scrap).

(b) Synthetic rubber.

(c) Oil- and fire-resisting rubber hosing and high pressure hosing.

(d) Tyres and tubes, other than those for pedal cycles.

Chemicals—Chemicals of importance in the production of:—

(a) Chemical warfare preparations.

(b) Military pyrotechnics.

(c) Fuels for self-propelling missiles.

(d) Additives for mineral oils.

(e) Strategically important plastics.

(f) Explosives and stabilisers, detonators, initiators and plasticisers for explosives.

(g) Anti-freeze and de-icing preparations.

(h) Fluids for use in hydraulically operated mechanisms.

(i) Materials having application in atomic energy.

(j) Special steels.

(k) Tyres and other rubber and synthetic rubber products.

(l) Refrigerants for use in tanks and submarines.

(m) Smoke screens and incendiary preparations.

Chemicals for use in the exploitation of mineral deposits and ores.

Catalysts for use in the manufacture of of nitric acid.

Chemical and Petroleum Equipment and Plant.

(a) For the production of poisonous gases.

(b) For the production of chemicals for explosives, propellants, etc.

Toxic Chemicals in Agriculture

THE Working Party on Precautionary Measures against Toxic Chemicals used in Agriculture, of which the first report was published by H.M. Stationery Office in April, 1951 (S.O. Code No. 24-190) has been asked by the Ministers concerned to inquire whether any risks arise from the point of view of the consumer of the final product, in the use of toxic chemicals in agriculture and in the storage of food, and to make recommendations for protective measures.

Membership of the Working Party is as follows:—Professor S. Zuckerman, C.B., F.R.S. (chairman); Dr. J. M. Barnes, Dr. R. H. Barrett, Mr. A. B. Bartlett, Mr. P. N. R. Butcher, C.B.E., Mr. W. Morley Davies, Mr. N. R. C. Dockeray, Dr R. A. E. Galley, Mr. R. F. Giles, Mr. C. T. Gimingham, O.B.E., Mr. A. Holness, Dr. B. S. Lush, Mr. J. R. McCallum, Dr. R. J. Peters, Dr. H. V. Taylor, C.B.E., D.F.C., V.H.M.; Mr. H. Cole Tinsley. Mr. K. R. Allen and Mr. W. K. Melrose (joint secretaries).

Organisations wishing to submit written evidence to the Working Party should write to Mr. W. K. Melrose, Ministry of Food, Portman Court, London, W.1.

Agricultural Chemicals

British Advances to be Studied

RECENT advances in the development of insecticides and weedkillers in Britain are being studied by visiting specialists from the Netherlands, France, Belgium, Italy, Norway, Sweden, Finland, Australia, New Zealand and Egypt under arrangements made by the British Council. The first week of the course is being spent at Rothamsted Experimental Station, where the Director of Studies is Dr. C. Potter, Head of the Insecticides and Fungicides Department.

The party includes Dr. G. Scaramuzzi, Plant Pathologist in the Italian Ministry of Agriculture; Dr. Maria J. Van Royen, chief chemist of the Dutch firm, Chemische Industrie; Wing-Commander F. H. Denton, director of the New Zealand firm of Sprayowin Ltd. and a pilot engaged in anti-locust research and pest control by spraying from aircraft; and Mr. Zahran, of the Egyptian Ministry of Agriculture.

Programme

On 23 June they visited the Eastern Provincial Headquarters of the National Agricultural Advisory Service at Anstey Hall, Trumpington, before proceeding to Cambridge. During a day tour of Pest Control, Ltd., Bourn, on 25 June, the visitors saw a practical field demonstration of the firm's latest developments in spraying, dusting and gassing machinery, including a demonstration of spraying by helicopter.

At the Shell Petroleum Co., Ltd., Woodstock Farm, Sittingbourne, Kent, (26 June) the programme included a demonstration of experimental spraying equipment, and at the Imperial College Field Station, Ascot, Berks (27 June) a talk was given on the Ministry of Agriculture scheme for approval of plant protection products.

The horticultural research station of Plant Protection, Ltd., at Verdley Place, Fernhurst, near Haslemere, Surrey, was visited on 28 June. After a tour of the farm, greenhouses and orchards, the party joined members of Plant Protection's International Congress to see a demonstration of the latest plant protection machinery. They then divided into two groups, one going to Oxford (28 June—4 July) and the other to Bristol (28 June—30 June).

The programme at Oxford, under the direction of Professor G. E. Blackman, head of the Department of Agriculture at the University, will include a tour of the neighbouring countryside to illustrate some of the main weed problems, and a visit to the University Field Station at Wytham. Additional visitors are expected from France, Norway, and Columbia to attend the programme at Oxford.

Chemical Analysis of Milk

Three New British Standards

Following the recommendations of the British Commonwealth Standards Conference in 1946, a technical committee was set up under the authority of the Dairying Industry Standards Committee of the British Standards Institution to prepare British Standard methods of analysis for dairy products.

Three of these standards have now been published which cover methods of chemical analysis of liquid milk (B.S.1741 : 1951); condensed milk (B.S.1742 : 1951); and dried milk (B.S.1743 : 1951).

In relation to liquid milk, the standard, besides giving a method for the preparation of the sample, also provides methods for determining total solids, fat, ash, nitrogen (protein), titratable acidity and in addition a means for the detection of hypochlorite.

The problem of standardising methods of analysis for condensed milk has been the subject of many investigations, notably by the milk products sub-committee to the Standing Committee on Uniformity of Analytical Methods of the Society of Public Analysts and other Analytical Chemists.

Besides a method for preparing the sample, the standard covers the determination of total solids, total milk solids in sweetened condensed milk, fat, ash, nitrogen (protein) and sucrose.

In the standard for dried milk, in addition to a method for preparation of the sample, methods are given for determination of moisture and total solids, fats, nitrogen (protein), ash, alkalinity of ash, titratable acidity, bulk density, and sediment.

Copies of these standards may be obtained from the British Standards Institution, Sales Department, 24 Victoria Street, London, S.W.1, price 2s., 2s. 6d. and 2s. each, respectively, post paid.

Importance of Research Associations

Minister of Supply on Need for Co-ordination

FUTURE national strength depends largely on the degree of effort devoted to research —both civil and defence. Never has the standing of the research associations been so high nor their influence so far reaching, said Mr. G. R. Strauss, Minister of Supply, speaking at a luncheon in London at a conference on 22 June between the Advisory Council for Scientific and Industrial Research and the chairmen and directors of the industrial and nationalised research associations.

Problems confronting the research associations and their responsibilities were far greater than ever before, continued the Minister. Operational research was included in the programme of the conference, and that was as it should be, for research on processes in full scale operation frequently revealed problems other than purely technical ones.

Processes need people to work them, and sociological questions inevitably arose in addition to those of physics, chemistry and engineering. Such questions might not be regarded as within their scope, but the country was waking up to the need to study them and he would like to see the research associations playing a leading part in this field too, said Mr. Strauss.

Since 1939 the number of research associations had doubled and there were now 42 with a total income of nearly £3,500,000 which was six times what it was before the war, while the Government grant now in the neighbourhood of £1,250,000 was approximately eight times the pre-war figure.

Man-power and Material Shortages

Co-ordination of research and its economical application was one of the most important functions of the research associations. In view of the shortage of scientific man-power it was essential that their should be no wasteful duplication of effort.

One of the major problems of today was the shortage of raw materials. Most materials were scarce—the needs of rearmament coming on top of a high level of industrial activity had led to demands which had in many cases outstripped available resources—a situation likely to last for some years to come.

Efforts must be made, therefore, to use more efficiently the materials which were available. This was where the research associations could play a vital rôle in advising firms how to conserve scarce materials by economy in use, by recovery and re-use, and by substitution, without lowering of essential quality.

Metal Economy Necessary

The problem of economy in the use of metals was one which particularly concerned him as Minister of Supply continued Mr. Strauss and Mr. D. A. Oliver, had been appointed as Metals Economy Adviser.

An advisory committee was being formed under Mr. Oliver's chairmanship to bring under review ways of economising in the use of scarce metals for both rearmament and civil products, and to advise Mr. Richard Stokes, the new Minister of Materials and himself what could best be done to promote this development concluded Mr. Strauss. The committee would be composed of experts from industry and Government Departments. It had an important task to fulfil and would undoubtedly want the help and advice of the research associations. He knew that the committee could count on this and that it would be gladly given.

Cellulose Film Restrictions

THE Board of Trade has announced that it has been agreed with the manufacturers of transparent cellulose film that from Monday, 25 June, cellulose film may no longer be supplied for a number of less essential uses in the home market. Firms using film for these purposes will, however, be permitted to use up any stock which may be in their possession.

As the output of cellulose film is now restricted by the sulphur shortage it is necessary to conserve most of the supply for direct export and for the wrapping of other goods for sale in the export market, particularly in cases where hard currency may be earned by these means.

Sir John Cass College

Wide Scope of Courses in New Session

CHEMISTRY, physics and metallurgy play a prominent part in the 1951-52 session of the Sir John Cass College, Aldgate, London, of which the prospectus has just been issued.

Time tables are given for full-time, part-time (day and evening), and evening courses for intermediate science, B.Sc. (General) Degree and B.Sc. (Special) Degree examinations, also particulars of post-graduate courses for M.Sc., Ph.D., or D.Sc. degrees.

An interesting programme has been arranged in the department of chemistry and biology, of which A. J. Lindsey, M.Sc., Ph.D. (Lond.), F.R.I.C., A.M.I.E.E., is the head.

Courses of lectures with practical work include the following:—

Microchemical analysis—Ten lectures on Tuesday evenings in the second term followed by practical work in the third.

Radiochemical analysis—Approximately ten lectures on Thursday evenings in the first term with practical work in the second.

Spectrochemical analysis—Ten lectures on Friday evenings in the first term with practical work in the second.

Microbiology—A course of lectures and practical work suitable for chemists and biologists wishing to gain specialist knowledge of microbiological technique will be arranged.

Chemical engineers and industrial chemists should find the following courses of value:—

Theory of Diffusion Processes—A series of lectures based on thermodynamics, on Friday evenings in the first term, concerned with design of chemical plant.

Distillation—Approximately eight lectures on Friday evenings in the second term. Dealing with theory and practice, this course should interest petroleum technologists.

Heat Transfer—Approximately six lectures on Friday evenings in the third term.

Statistical Methods—A series of lectures on Monday evenings in the first and second terms intended to give those engaged in experimental work a knowledge of applied statistics.

Patent Law will be the subject of about eight lectures in the second term, while four lectures in the third term will be devoted to Trade Marks.

German for chemistry students will be taken by W. Siegel, D.Phil. (Berlin). The courses form part of the B.Sc. (Special) course in chemistry. No previous knowledge of German is assumed.

Petroleum technology will be dealt with in a series of about 20 lectures on Thursday afternoons during the first and second terms. Given by a number of experienced speakers the lectures will be addressed to those engaged in a non-technical branch of the industry to enable them to gain a knowledge of other branches.

In the Department of Metallurgy the series of lectures will cover Metallurgy of Engineering Metals and Alloys; Construction of Works; Domestic and Industrial Fuel; and Fuel Analysis.

Crystallography will be the subject of two special courses of 10 lectures each, in the Department of Physics. Given by L. A. Thomas, B.Sc., F.Inst.P., Crystal Physics will be covered in the first term and X-ray Crystallography in the second. The courses will be complementary, but each will be complete in itself.

Other lectures in this department include 'The Quantum Theory of Metals,' by Professor C. A. Coulson, M.A., D.Sc., F.R.S.; Electron Diffraction; and Scientific German.

The prospectus also gives names of staff and lecturers, enrolment instructions, fees etc., and a brief historical note on the foundation and growth of the college.

More Isopropyl Alcohol

ALL plant units of British Petroleum Chemicals Ltd. (a subsidiary of Anglo-Iranian Co., and Distillers Co.) at Grangemouth for the production of isopropyl alcohol, have been erected, and supplies of the previously imported material are expected to begin shortly. The starting material for the production of the isopropanol will be obtained from the adjoining refinery of Scottish Oils, Ltd., another subsidiary of Anglo-Iranian. British Industrial Solvents, Ltd. hope that shortly after production begins, it will be able to meet all acetone requirements in Britain, where at present users are limited to 60 per cent of their normal consumption. Diacetone alcohol supply, short at the moment, will also increase.

The Chemist's Bookshelf

ORGANIC SYNTHESES. Vol. 30. Edited by A. C. Cope, *et al.* John Wiley & Sons, Inc., New York. Chapman & Hall, Ltd., London. 1950. Pp. 115. 20s.

The publication of a new volume of 'Organic Syntheses' is always something of an event in the organic research laboratory. The knowledge that a compound is available by a reliable method may stimulate a new line of research or resuscitate an old one. Each chemist looks through the index anxiously, hoping to find material to assist him in the exploration of his own particular line of research. Indeed Organic Syntheses has become so much of an institution that it is difficult to find a firm basis for criticism. Perhaps the easiest method of assessment is to define the perfect volume which is always anticipated and then judge how far volume 30 falls below this ideal. The first criterion, or rather, requirement of a perfect volume is that all the preparations described shall be absolutely reliable and clearly and unequivocably explained. It would of course be quite impossible to test this requirement satisfactorily without carrying out all the preparations oneself, and so we must rely on previous experience and assume the present collection to be of the same standard as its predecessors, against which no complaint has been levelled. It is sufficient to say that the description is as clear and concise as before and that reference to other authorities is unnecessary.

The second requirement of our perfect volume is that it should contain descriptions of preparations which are of interest to everybody. This is of course an impossible requirement and we must replace it by the more modest request that the material should be of as general an interest as possible.

Volume 30 contains 39 preparations and of this number 28 are of the widest general interest. These include two aliphatic amino-acids, two substituted acetylenes, three nitriles, two aromatic aldehydes, two pyridines and an aromatic amine. Among the aliphatic preparations are such general purpose reagents as methane sulphonyl chloride, ethylene imine, and ethane dithiol. There are also preparations which will interest the fortunate few, and these include 9-acetyl-anthracene, tetraphenyl arsonium chloride hydrochloride, and 2,3-pyrazine-dicarboxylic acid.

The index at the end of this volume refers only to the volume itself and the index to the previous volumes is to be found in volume 29. In view of the fact that there are at least eight blank pages at the end of the preparations and index in volume 30, it is difficult to see why a complete index was not printed, as this facility consideraby enhances the value of each individual volume. —J.R.M.

PRINCIPLES OF NUCLEAR CHEMISTRY. By Dr. R. R. Williams. D. van Nostrand Co., Inc. (New York and Toronto) and Macmillan & Co. (London). 1950. Pp. lx + 307. 28s. 6d.

This book is intended as an introduction for advanced undergraduates and graduate students as nuclear chemistry is now a separate subject in many degree courses in the United States and it is gradually becoming so in many universities of this country.

The first part deals with the general properties of nuclei and includes a large amount of so called nuclear physics which the author submits is necessary before an adequate treatment of the chemical properties can be made. This is fundamentally sound but has led to the inclusion of some material which will have been covered by many of the students while such subjects as self-absorption have been passed over.

The sections on radio-chemistry serve as an admirable introduction to such topics as the Syzilard-Chalmers reaction and the irradiation of aqueous solutions. They also include some useful information on the artificial elements and fission processes. Since the book was written a number of papers have been published which indicate the possible use of the Szilard-Chalmers process as a means of studying certain free radicals.—M.C.H.

HOME

N.T.P. Sales Office

The sales office of National Titanium Pigaments Limited is now located at Hanover House, 14 Hanover Square London, W.1. The telephone number is Mayfair 6001/3 and the telegraphic address is 'Titanium Wesdo London.'

Remittances should still be sent to the firm's accounts department at Luton, Beds.

Another Atomic Pile Working

Completed several months ahead of schedule, the second pile producing plutonium is working at the Sellafield atomic energy factory in West Cumberland. Scientists at the factory are said to be well satisfied with the results.

Kaylene Outing

The employees of Kaylene Limited were the guests of the managing director, Sir W. Arbuthnot Lane, Bt., and the Board of Directors on 9 June at their Annual Staff Outing which took the form of a motor coach trip to Brighton.

Seed Crushers Congress

To mark the year of the Festival of Britain, the Annual Congress of the International Association of Seed Crushers was held recently at Brighton.

Mr. Guy Chipperfield, chairman of the British Oil and Cake Mills, Ltd., and of the National Seed Crushers' Association of Great Britain, was unanimously elected president of the Association in succession to Mr. J. W. Pearson, who has held that office for 30 years. At a farewell official luncheon, Mr. Chipperfield, on behalf of the delegates, presented Mr. and Mrs. Pearson with an illuminated album and with personal gifts, and paid fitting tribute to Mr. Pearson's outstanding services to the Association and to the industry.

Most Modern Jute Factory

A circular-loom jute factory, claimed to be the first of its kind in the world, was opened in Dundee recently by Lord Bilsland, chairman of the Scottish Council (Development and Industry). The factory is part of the new Manhattan works of Jute Industries, Ltd. When the project is finally completed about £600,000 will have been spent in reconstruction and equipping with the most up-to-date automatic machines.

The Kent Receiver Recorder

In our issue of 9 June, on page 875, we published a short description of the new multipoint air-operated receiver recorder manufactured by George Kent Limited. Unfortunately the penultimate sentence of the description gives the impression that the synchronous A.C. motor driving the chart on the recorder lasts for two months at standard speed. It is, of course, the chart itself which lasts for two months, not the motor, which will last indefinitely.

Conference on Automatic Control

Leading scientists and technicians from many countries will meet at the College of Aeronautics, Cranfield, near Bedford, from 16-21 July, for a conference on the theory and use of automatic control. Britain has made major contributions to developments and advances in this field, which is of increasing importance to industry. The inaugural address will be given by Sir Ben Lockspeiser, Secretary of the DSIR, and papers will be read by scientists from Canada, Europe and the U.S.A.

Ipdustrial Safety

The Industrial Safety Exhibition held at Bingley Hall, Birmingham, recently was visited by 9,314 people. Among the exhibits of interest to the chemical industry were: anti-acid boots, rubber gloves and protective aprons shown by Dunlop and Co., Ltd.; non-slip floors by Semtex, Ltd.; flame and chemical proof clothing by the R.F.D. Co., Ltd.; flameproof equipment by the General Electric Co., Ltd.; safety goggles and helmets by the Stratford Products Safety Service Co., Ltd.; and an accident prevention Mobile Information Centre by I.C.I.

Seaweed Research

Work carried out by the scientific and technical staffs of the Institute of Seaweed Research at Inveresk, Midlothian, may be seen by the public every Friday afternoon from 2.30-4.30 p.m. during the period of the Festival of Britain. This arrangement will not be affected by the change in the constitution by which (from today, 30 June) the Scottish Seaweed Research Association becomes the Treasury-financed Institute of Seaweed Research.

OVERSEAS

U.S. Zinc Restrictions

'At no time during World War II was zinc as short as it is today,' say officials of the U.S. National Production Authority. A larger share of high grade zinc is now being allocated to defence and essential civil needs, and producers now have to set aside 20 per cent of their slab zinc output (99.9 per cent pure) and 10 per cent of their other grades for these purposes, as well as 5 per cent of their anticipated monthly production as a reserve to meet emergency requirements. Users of high grade zinc are limited to 70 per cent of their average quarterly consumption in the last six months of 1950, others to 80 per cent. Lead manufacturers are required to set aside 25 per cent of production for defence and essential needs. This order also affects lead chemicals containing 50 per cent or more lead by weight.

Norwegian Nitrates Expand

An improved electrolytic method for producing nitrogen which will increase the company's production of nitrogenous fertilisers by as much as 25 per cent without any rise in power consumption has been developed by Norsk Hydro's research laboratories. New plants based on the improved method are being erected at Glomfjord and Heroya at a cost of £1,000,000, and they are expected to increase the yield of nitrogen by 8,000-9,000 tons annually. Further plants costing £5,000,000 are envisaged.

Russian Sulphur Shortage

D. B. Shimkin of Harvard's Russian Research Centre has estimated that the maximum production of the U.S.S.R. in sulphuric acid last year was below the 2,000,000 metric tons required to fulfil fertiliser production plans. This sulphur shortage—quite as acute, thinks Mr. Shimkin, as anywhere else in the world—is thought to be a major factor behind the failure to achieve goals in the fourth Five-Year Plan for phosphate fertilisers. It is thought to be due to lack of sulphur-bearing materials, which the U.S. embargo on sulphur exports accentuated, combined with lack of efficiency in Soviet manufacturing processes

Powder Washing

Sand encrustations, fins, pads, chaplets or chill nails, and other forms of excess metal can be removed from castings quickly, easily and economically by means of an oxy-acetylene method recently developed by Linde Air Products Company, a division of Union Carbide and Carbon Corporation, New York City. The new process, called Powder-Washing, utilises a special blowpipe, equipped with external powder-washing attachment. With this apparatus, an iron-rich powder is fed through oxy-acetylene pre-heat flames into a low-velocity oxygen stream where it burns and produces superheated liquid iron oxide. Heat from the combustion of the powder and from the slag simplifies and speeds the removal of metal and metal-sand mixtures. Wherever the powder-fed flame is directed against a casting, the metal surface is brought quickly to kindling temperature, and then it is oxidised and blown away by the oxygen stream.

New American Insecticide

The United States Rubber Co., has developed a new non-toxic chemical—'Aramite'—to kill mites, bugs and other insects pestering fruit growers, nurserymen, chicken and home gardeners. Chemically it is 2-(*p-tert*-butylphenoxy *iso*propyl-2-chloro-) ethy' sulphite, and is a wettable powder, compatible with nicotine sulphate, 'Toxaphene,' lead arsenate, 'Phygon-XL,' 'Ferbam,' D.D.T., 'Chlordane,' and B.H.C., but not with Bordeaux mixture of lime.

U.S. Magnesium Coating

The U.S. Army Ordnance Corps has developed a new finish for magnesium and its alloys, known as HAE. The process produces electrolytically a hard, adherent, refractory ceramic coating in a manner similar to anodising, being brown in colour. A hydrofluoric acid dip imparts a lighter shade to the coating and also renders it more abrasion- and corrosion-resistant, as well as removing residual alkalis on the surface, thus ensuring a good paint base. It has good dielectric strength and a high melting point, as well as being able to scratch glass and polish certain steels. The cost will probably be similar to that of anodising aluminium.

Publications & Announcements

JUST published by the technical director of Industrial Chemicals (India), A. K. Madan, a complete survey of chemicals and industry entitled 'The Economic Prospects of Chemical Industries in India' has received very high recommendations from many Indian and other authorities in the field. It contains 14 chapters on a variety of subjects, covering a general industrial survey, the resources of India; heavy, fine, explosive and photographic chemicals; dyestuffs, plastics, electroplating, fertilisers, paints, constructional materials, and training and education, as well as four appendices on statistics and other subjects. The field seems to be very soundly covered, and copies may be obtained from the firm at Central Bank Buildings, Masjid Bunder Road, Bombay, 3.

* * *

REPRESENTING the accumulated knowledge of more than 40 years, the sixth and latest edition of the U.S. Bureau of Mines' bulletin, 'Methods of Analysing Coal and Coke', has just been issued. Used for many years as a standard reference work in laboratories, this revised edition was prepared by Dr. A. C. Fieldner, chief fuels technologist of the Bureau of Mines, Washington, D.C., and W. A. Selvigm, supervising chemist of the Coal Constitution and Miscellaneous Analysis Section, at the Bureau's Pittsburgh, Pennsylvania, experimental station. Containing 51 pages, it describes in detail laboratory methods for analysing coal and coke, and is called Bulletin 492. It may be purchased at fifty cents from the Superintendent of Documents, U.S. Printing Office, Washington, D.C.

* * *

IT is always interesting to see a new magazine on the market, as well as being a little inspiring in these days of scarce paper, controls, prices and everything else. 'What's New'—an attractively laid out magazine published 'as a service to the medical profession' by Abbott Laboratories, Ltd., had its first issue this month. Primarily a magazine for the medical world, it deals with the latest developments in drugs, vitamins and all the countless chemical substances now aiding medicine. This issue has articles on Toluidine Blue as an anti-haemorrhage chemical for bad radiation casualties, on cases of hyper-sensitivity to penicillin, on the minute particles of fat—chylomicrons—in the arteries that cause arteriosclerosis in old people, on vitamin B_{12}, and on the use of 'Paradione' in epilepsy. Necessarily selective, the magazine nevertheless deals authoritatively and unsensationally with developments in medical science.

* * *

LIFTING and moving of drums, carboys, cylinders, and so on, frequently present problems in the chemical industry, as also does the question of storage, especially where space is limited. W. Langley & Co., Ltd., London, in its latest leaflets demonstrate easy methods of handling and storing drums and barrels by means of a combined stand and tilt which makes a 40-gallon drum or barrel full of fluid a safe load for one man. A carboy holder and tipper ensuring greater safety and avoiding waste is another useful product of this company, which is also responsible for the Maglan factory sack truck, barrel skid, cylinder hand trucks and various accessories for drums and barrels.

* * *

INFORMATION on nickel is contained in two publications issued this week—the Nickel Bulletin, Volume 24, No. 4, published by the Mond Nickel Company, and a brochure on high-nickel alloys for heat-resisting equipment, published by Henry Wiggin & Co., Ltd., of Birmingham. The number of new technical papers published on spheroidal-graphite cast iron indicates the increasing interest on the part of metallurgists and engineers in this relatively new development. The current issue of the Nickel Bulletin includes extended abstracts of three important papers on this material; one reviews the present stage of development with representative mechanical properties and typical applications; the second and third deal in some detail with various types of heat-treatment. A further abstract on new materials for gears includes a review of the properties of ductile cast iron, indicating its potential value in this field, and also describes the use and manufacture of 'Nitralloy N' a 3½ per cent nickel-chromium-molybdenum steel with an addition of aluminium.

· PERSONAL ·

The appointment of DR. EGON OROWAN as George Westinghouse Professor of Mechanical Engineering at the Massachusetts Institute of Technology was announced recently. Dr. Orowan succeeds PROFESSOR WILLIAM R. HAWTHORNE, who has held the Westinghouse chair since 1948. Professor Hawthorne is resigning to accept the post of the Hopkinson and Imperial Chemical Industries Professorship of Applied Thermodynamics at Cambridge University.

Dr. Orowan is one of the outstanding authorities in the general field of physics of metals and has made numerous contributions of great significance to the behaviour of solids under stress. He was born in Budapest, Hungary, in 1902 and studied at the Technical University of Berlin-Charlottenburg, and for some time was in charge of the Krypton Gas Works of the United Incandescent Lamp and Electric Company. This was the first plant in the world to produce krypton commercially from air.

In 1937, Dr. Orowan resumed his research work on the mechanical properties of metals in the physics department of the University of Birmingham in England. In 1939 he was associated with the Cavendish Laboratory under Sir Lawrence Bragg, where he was head of the metal physics group and Reader in the physics of metals in the University of Cambridge. He received the Thomas Hawksley Gold Medal of the Institution of Mechanical Engineers in 1945 and became a Fellow of the Royal Society in 1947.

MR. LAURANCE CHRIMES, M.B.E., T.D., A.C.A., whose appointment as Secretary to Evans Medical Supplies, Ltd., from 31 October next, was announced in the Company's annual report, was educated at Rossall and articled to a firm of chartered accountants in Liverpool.

Before and after the last war, Mr. Chrimes was on the staff of *The Daily Telegraph*. During the war he had a distinguished career in the R.A. finishing with the rank of Lt.-Col. as C.O. of the Bedfordshire Yeomanry 52nd Heavy Regt. In addition to the M.B.E. and T.D., Mr. Chrimes had two 'mentions' and was awarded the Belgian Croix de Guerre and Order of Leopold.

The election of MR. L. RUSSELL MUIRHEAD to the Board of Ernest Benn, Ltd., last Monday marks an association of 20 years between the company and the well-known series of travel companions, *The Blue Guides*, of which Mr. Muirhead has been editor throughout that period. During the second World War, when travel for pleasure was in eclipse, Mr. Muirhead served as Editor of THE CHEMICAL AGE and is well-known to members of the trade.

DR. S. J. GREGG, Reader in Chemistry, University College of the South West, Exeter, left Britain by air on 23 June to visit Uruguay and Brazil. He will be guest of the Faculty of Chemistry, University of Montevideo, for approximately 10 weeks and will afterwards lecture and demonstrate on 'High Vacuum Technique' in Rio de Janeiro for the British Council.

Science was well represented in the distinguished gathering which attended the honorary graduation held on 20 June as part of quincentenary celebrations of Glasgow University. Among those on whom the honorary degree of Doctor of Laws was conferred were:—

PROFESSOR NEILS BOHR, professor of theoretical physics, Univesity of Copenhagen; SIR JOHN COCKROFT, director of the Atomic Energy Research Establishment; PETRUS JOHANN DU TOIT, president of the South African Council for Scientific and Industrial Research; PROFESSOR HUGO KRUYT, formerly professor of physical chemistry, University of Utrecht; PROFESSOR ERNEST LAWRENCE, professor of physics, University of California; PROFESSOR LEOPOLD RUZICKA, professor of organic chemistry in the Swiss Federal Institute of Technology; SIR RICHARD SOUTHWELL, rector of the Imperial College of Science and Technology; SIR VICTOR DUNN WARREN, Lord Provost of the City of Glasgow.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

F. CHERRY & THURMOTT, LTD., Walton-on-Thames, chemists. (M., 30/6/51). 17 April, charge, to Barclays Bank Ltd., securing all moneys due or to become due to the Bank; charged on 7 River Mount, Walton-on-Thames. *Nil. 28 December, 1948.

HANCOCK & CO., LTD., London, E.C., chemists. (M., 30/6/51). 19 April, mortgage or charge, to Westminster Bank Ltd., securing all moneys due or to become due to the Bank; charged on 112 Station Road, Chingford with fixtures. *£1,475. 29 December, 1949.

JONSAN LTD., Carmarthen, chemists, etc. (M., 30/6/51). 16 April, mortgage, to Midland Bank Ltd,, securing all monies due or to become due to the Bank; charged on druggists shop and licensed bar, 7 Guildhall Square, Carmarthen, fixtures, goodwill of business, benefit of licenses, etc. *Nil. 10 October, 1950.

F. A. KETCH & SON., LTD., Birmingham. manufacturers of casein and plastic products, etc., 16 April, mortgage to Midland Bank Ltd., securing all moneys due or to become due to the Bank; charged on Trent Valley House, Trent Valley Road, Lichfield. with machinery, fixtures, etc. *Nil. 19 May, 1948.

REYNOLDS SCIENTIFIC GLASS WORKS, LTD., Sunbury-on-Thames (M., 30/6/51). 21 April, £1,200 (not ex.) mortgage to Lloyds Bank Ltd., charged on 53 Hanworth Road, Sunbury. *£2,727. 12 May, 1950.

Satisfaction

GLAISYER & KEMP (CHEMISTS), LTD., Brighton. (M.S., 30/6/51). Satisfaction 24 April of mortgage registered 20 June, 1939.

New Registration

Maiden Laboratories, Ltd.

Private company. (496,659.) Capital £100. Manufacturers, wholesalers and retailers of pharmaceutical goods and other chemical substances. Directors: W. Farag and J. H. Maiden. Reg. office: 19 Birmingham Road, Great Barr, Birmingham.

New Sulphur Process

Economical Use of Low-Grade Ores

EXTRACTION of sulphur from low-grade sulphur ores has always intrigued chemical engineers of the industry, but so far has had to be abandoned because of excessive cost.

A new refining process suitable for working deposits formerly considered too low in sulphur content to be economical has now been developed by the Chemical Construction Corporation according to a report in the *Chemical and Engineering News.*

The method is claimed to be competitive with the Frasch process, which at present supplies 90 per cent of the world's sulphur. The secret of the new process is contained in the fusing or joining of fine sulphur particles into large aggregates.

Steps involved are:—

(1) Grinding, which separates particles of free sulphur from the low-grade ore; (2) suspending the ground ore in water; (3) heating the slurry of ground ore and water above the melting point of sulphur (120°C.) and agitating, in order to coalesce or fuse the fines; (4) cooling the slurry below the melting point to form droplets that become nodules or small lumps of 98 per cent sulphur; (5) passing the mixture from the cooling tank over a vibrating screen to sift out the small lumps of sulphur into a melt tank; (6) processing the smaller material that remains through two flotation stages to produce 95 per cent sulphur; (7) adding this to the sulphur that has already been sifted into the melt tank and filtering the mixture to produce sulphur of 99-100 per cent purity.

Sources containing as little as 20 per cent sulphur can be used in the new process. Preliminary surveys have indicated that many millions of tons of sulphur in this form are readily available in California and northwest Wyoming alone. A vein running through the Andes Mountains of South America is the largest known deposit.

British Chemical Prices

LONDON.—The firm trend in values continues to be the chief feature of the market and the spot demand for most of the routine industrial chemicals is in excess of offers. There is also a fair volume of overseas enquiry in circulation much of which must remain unsatisfied owing to the priority of home requirements. Pressure for deliveries of chlorate of soda, caustic soda, and soda ash has been reported, and there has been a good call for all grades of hyposulphite of soda. There have been no further price alterations in the non-ferrous metal compounds and a steady demand for the lead oxides is reported. Demand for the coal tar products continues strong with little on offer for near delivery.

MANCHESTER.—Traders on the Manchester chemical market during the past week have reported a persistent flow of delivery specifications from home-trade consumers. These have covered a wide range of products, including the alkalis and the potash and ammonia compounds. In addition, there has been a fair number of fresh inquiries in the market from domestic users as well as from shippers and steady additions to order-books in all sections are being made. The price position continues very firm. A brisk movement of supplies of the light and heavy coal-tar products is also reported and the advances in the benzoles and other materials that have just come into operation has not reduced the pressure for supplies.

GLASGOW.—As far as the heavy chemicals are concerned, there has been no slackening in demand and supplies generally are being well maintained. There are still some troublesome shortages which unfortunately show no immediate signs of betterment but the overall position, taking everything into consideration, is extremely healthy and there is undoubtedly an astonishing volume of business going through. The demand for exports is still firm and shows no sign of easing for some considerable time.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 1 ton, £110 ; 80% pure, 1 ton, £116 ; commercial glacial 1 ton, £129 ; delivered buyers' premises in returnable barrels ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £166 per ton.

Acetone.—Small lots : 5 gal. drums, £105 per ton ; 10 gal. drums, £100 per ton. In 40/50 gal. drums less than 1 ton, £85 per ton ; 1 to 9 tons, £84 per ton ; 10 to 50 tons, £83 per ton ; 50 tons and over, £82 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 4s. 7½d. per proof gallon ; 5000 gal. lots, d/d, 4s. 8½d. per proof gal.

Alcohol, Diacetone.—Small lots : 5 gal. drums, £133 per ton ; 10 gal. drums, £128 per ton. In 40/45 gal. drums : less than 1 ton, £113 per ton ; 1 to 9 tons, £112 per ton ; 10 to 50 tons, £111 per ton ; 50 to 100 tons, £110 per ton ; 100 tons and over, £109 per ton.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER : Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER : £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non-returnable drums ; 1 ton lots £47 per ton.

Ammonium Chloride. — Grey galvanising, £27 10s. per ton, in casks, ex wharf. Fine white 98%, £21 10s. to £22 10s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate. — MANCHESTER : £5 15s. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £88 and £86 10s. per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots as to grade, etc., 2s. 7d. to 3s. 8½d. per lb. Crimson, 4s. 1d., to 5s. 6d. per lb.

Arsenic.—Per ton, £44 5s. to £47 5s., ex store.

Barium Carbonate.—Precip., d/d ; 2-ton lots, £30 per ton, bag packing.

Barium Chloride.—£40 10s. 2 ton lots d/d bags.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £33 5s. per ton d/d ; 2-ton lots, £33 10s. per ton d/d.

Bleaching Powder.—£19 10s. per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid: Anhydrous, £60 10s. ; in 1-cwt. bags; commercial, granular, £39 10s. ; crystal, £42 ; powder, £43 ; extra fine powder, £44 ; B.P., granular, £48 10s. ; crystal, £51 ; powder, £52 ; extra fine powder £53.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid : Commercial, granular, £69 ; crystal, £76 ; powder, £73 10s. ; extra fine powder, £75 10s. ; B.P., granular, £81 ; crystal, £88 ; powder, £85 10s. ; extra fine powder, £87 10s.

Butyl Acetate BSS.—£263 per ton, in 10-ton lots.

Butyl Alcohol BSS.—£250 per ton, in 10-ton lots.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid £9 12s. 6d. per ton, in 4-ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 6d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Per lb., d/d buyers' premises, for 5 cwt. or over, anhydrous, 1s. 9d. plus 10%, other, 1s. 9d. ; 1 to 5 cwt., anhydrous 1s. 9½d. plus 10%, other 1s. 9½d. Higher prices for smaller quantities. All subject to a trade discount of 5%.

Cobalt Oxide.—Black, delivered, 11s. 2d. per lb.

Copper Carbonate. — MANCHESTER : 2s. 5d. per lb.

Copper Chloride.—(63%), d/d, 2s. 9d. per lb.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(63%), d/d, 2s. 8d. per lb.

Copper Sulphate.—£88 12s. 6d. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £11 12s. d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £174 per ton.

Formaldehyde.—£33 per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £66 to £67 10s. per ton, carriage paid.

Glycerin.—Chemically pure, double distilled 1,260 s.g. £14 9s. 0d. per cwt.
Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb. ; free-running crystals are quoted at 2s. 3d. to 2s. 6d. per lb. ; bulk carriage paid.

Hydrochloric Acid.—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—27.5% wt. £116 per ton. 35% wt. £146 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 20s. 10d. per lb. in cwt. lots.

Iodoform.—24s. 9d. per lb. in cwt. lots.

Iron Sulphate.—F.O.R. works, £3 15s. to £4 5s. per ton. Bags free.

Lactic Acid.—Pale tech., 44 per cent by weight £130 per ton ; dark tech., 44 per cent by by weight £110 per ton ex works ; Usual container terms.

Lead Acetate.—White : £146 10s. per ton.

Lead Carbonate.—Nominal.

Lead Nitrate.—£150 per ton.

Lead, Red.—Basis prices per ton : Genuine dry red lead, £178 10s. ; orange lead, £190 10s. Ground in oil : red, £201 ; orange, £213.

Lead, White.—Basis prices : Dry English, in 8-cwt. casks, £185 per ton. Ground in oil : English, under 2 tons, £203 10s.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton ; grey, 80-82%, ton lots, d/d, £22 to £25 per ton.

Litharge.—£178 10s. per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light, commercial, d/d, £87 15s. ; cwt. lots £97 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light, commercial, d/d, £221 ; cwt. lots £227 10s. per ton d/d.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 10s. 8d. ; smaller quantities dearer.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 4s. 2d. per gal. ; pyridinised 64° O.P. 100 gal., 4s. 4d. per gal.

Nickel Sulphate.—Deld. buyers U.K. £140 10s. per ton.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—About £146 per ton, packed in 5-cwt. lots, packed in free 5-cwt. casks.

Paraffin Wax.—From £58 10s. to £101 17s. 6d., according to grade for 1-ton lots.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £67 per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 2½d. per lb.

Potash, Caustic.—Solid, £88 10s. per ton for 1-ton lots ; flake, £105 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate.—Crystals and granular, 10¾d. per lb. ; ground, 11¾d. per lb., for not less than 6 cwt. ; 1-cwt. lots, ¼d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £88 10s. per ton for 1-ton lots, ex store ; hydrated, £81 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96%, 6-ton lots, £16 10s. per ton.

Potassium Iodide.—B.P., 17s. 11d. per lb. in 28 lb. lots.

Potassium Nitrate.—Small granular crystals, 81s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots ; for 3 cwt. and upwards, 1s. 6½d. per lb. ; technical, £8 3s. per cwt. ; for 5 cwt. lots.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—Dog-tooth crystals, £72 10s. per ton ; medium, £67 10s. per ton ; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid.—MANCHESTER : Technical 2s. to 2s. 8d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic.—Solid 76/77% ; spot, £21 12s. 6d. per ton d/d. (4 ton lots).

Sodium Acetate.—£70 to £75 per ton d/d.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 9d. per lb. ; anhydrous, 9¼d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £40 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£52 to £57 per ton.

Sodium Cyanide.—100% basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals £28 a ton ; commercial, 1-ton lots, £26 per ton carriage paid.

Sodium Iodide.—B.P., 19s. 2d. per lb., in 28 lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £114 ton.

Sodium Metasilicate.—£19 to £19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98%, 6-ton lots, d/d station, £23 per ton.

Sodium Nitrite.—£29 12s. 6d. per ton.

Sodium Percarbonate.—12½% available oxygen, £8 4s. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots : Di-sodium, crystalline, £34 10s., anhydrous, £73 ; tri-sodium, crystalline, £36 10s., anhydrous, £70.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER : £6 10s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot. £27 per ton, d/d, in drums ; broken, £27 15s. per ton, d/d, in drums.

Sodium Sulphite.—Anhydrous, £57 12s. 6d. per ton ; pea crystals, £35 7s. 6d. per ton d/d station in kegs ; commercial, £22 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £20 4s. 6d. to £22 9s. 6d. according to fineness.

Tartaric Acid.—Per cwt. : 10 cwt. or more, £14.

Tin Oxide.—1-cwt. lots d/d £25 10s. (Nominal.)

Titanium Oxide.—Comm., ton lots, d/d (56-lb. /112 lb. bags), £122 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d ; white seal, £180 10s. ; green seal, £179 10s. ; red seal, £178.

Zinc Sulphate.—Nominal.

Rubber Chemicals

Antimony Sulphide.—Golden, 2s. 6½d. to 3s. 8d. per lb. Crimson, 3s. 6¾d. to 4s. 9¾d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Off colour, ex store. Imported £13 10s per ton. Extra white bleached ex store, £16.

Cadmium Sulphide.—About 20s. per lb.

Carbon Bisulphide.—£65 5s. per ton, according to quality.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£67 10s. per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 1s. 9½d. to 2s. 3d. per lb. ; dark, 1s. 8½d. to 2s. 1¼d. per lb.

Lithopone.—30%, £62 10s. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £13 1s. 6d.

Compound Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. Special No. 1, £20 17s. 6d.

"Nitro-Chalk."—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean agricultural for 6-ton lots d/d nearest station, £19 17s. 6d. per ton. Chilean industrial for 6-ton lots £23.

Coal-Tar Products

Benzol.—Per gal, ex works : 90's, 3s. 8½d. ; pure, 3s. 11½d. ; nitration grade, 4s. 2½d.

Carbolic Acid.—Crystals, 1s. 6d. to 1s. 8d. per lb. Crude, 60's, 5s. 8d. MANCHESTER : Crystals, 1s. 6d. to 1s. 8d. per lb., d/d crude, 5s. 9d., naked, at works.

Creosote.—Home trade, 8d. to 10½d. per gal., according to quality, f.o.r. maker's works. MANCHESTER : 6½d. to 9¾d. per gal.

Cresylic Acid.—Pale 98%, 5s. per gal. ; 99.5/100%, 6s. American, duty free, for export, 10s. naked at works.

Naphtha.—Solvent, 90/160°, 4s. 2½d. per gal. for 1000-gal. lots ; heavy, 90/190°, 3s. 8d. per gal. for 1000-gal. lots, d/d. Drums extra : higher prices for smaller lots.

Naphthalene.—Crude, ton lots, in sellers' bags, £18 2s. 3d. to £29 5s. 9d. per ton according to m.p. ; hot-pressed, £50 to £60 per ton, in bulk ex works ; purified crystals, £60 to £70 per ton. F.O.B.

Pitch.—Medium, soft, home trade, 115s. per ton f.o.r. suppliers' works ; export trade, 135s. per ton f.o.b. suppliers' port. MANCHESTER : £6 15s. f.o.r.

Pyridine.—90/160°, 27s. 6d. per gal. MANCHESTER : 26s. to 30s. per gal.

Toluol.—Pure, 4s. 7½d. per gal. MANCHESTER : Pure, 3s. 2d. per gal. naked.

Xylol.—For 1000-gal. lots, 5s. 1½d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton ; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal. ; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediate and Dyes
(Prices Nominal)

m-**Cresol** 98/100%.—3s. 6d. per lb. d/d.

o-**Cresol** 30/31° C.—1s. per lb. d/d.

p-**Cresol** 34/35° C.—3s. 6d. per lb. d/d.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb. ; 66/68° C., 1s.

p-**Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb. ; P.G. 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Chemical & Allied Stocks & Shares

A SUBSTANTIAL business has been transacted in stock markets, although the strong advance which followed the Budget was followed by a fair amount of profit-taking this month. Sentiment was affected by the Persian oil crisis, although at the time of writing hopes of peace moves in Korea have helped most sections of markets, with the exception of the commodity groups. Among the latter base metals and rubbers moved back on the view that an end of the war in Korea would be followed by a down-trend in commodity prices.

C.I.C. Problems

As was to be expected, chemical and kindred shares reflected with the general trend of markets, and although best levels were not held, have moved in favour of holders as compared with a month ago. Imperial Chemical have risen on balance from 50s. to 52s. 6d. at the time of writing. The City was mystified by the decision of the Capital Issues Committee to turn down the company's application for permission to distribute a share bonus. As there seems no logical reason for some of the decisions of the C.I.C. it is being pointed out that whenever an application is turned down the reasons should be given. The market believes that I.C.I. was planning a share bonus of 100 per cent, and that the directors felt there would be reasonable prospects of maintaining the dividend on the larger capital in the future.

Compared with a month ago, Monsanto have risen from 26s. 6d. to 29s. The 4s. units of the Distillers Co. continued active around 24s. in anticipation of the financial results and the possibility of a higher dividend. Laporte chemicals 5s. units have been firm at 12s. 3d. on the full results and chairman's statement.

Elsewhere, Albright & Wilson were 22s. 6d., F. W. Berk 2s. 6d. shares 7s. 3d., Brotherton 10s. shares 24s. 6d. and Boake Roberts 5s. shares 38s. 9d. Bowman Chemical 4s. shares were 7s., Amber Chemical 2s. shares 2s. 6d., Pest Control 5s. shares 7s. 3d. and L. B. Holliday 4½ per cent preference were 18s. Sanitas Trust 10s. shares have been firm at 21s. 6d., following the results. W. J. Bush ordinary shares were good and tightly held with business recorded up to close on £6 on higher dividend hopes. William Blythe 3s. shares were dealt in around 12s. 7½d. Hardman & Holden 5s. shares were 25s. 3d. with the new shares up to 5s. 9d. premium. Lever & Unilever were around 53s. on the financial results and higher dividend, and have come up from 49s. a month ago. There have been sharp fluctuations in Glaxo Laboratories, which, however, were considerably higher on balance for the month at 82s. 6d. against 76s. Borax Consolidated at 37s. 3d. have been well maintained and Fisons were little changed on balance at 28s. 6d. Shares of plastics and kindred companies moved generally higher with British Xylonite at 92s. 6d., De La Rue were 35s. and Kleemann 1s. shares 14s. 3d. There was again a good business in British Glues & Chemicals 4s. units, which have risen on the month from 26s. 3d. to 28s. 6d. and were up to 29s. 6d. at one time. United Molasses at 35s. 9d. have moved up strongly.

Higher Dividend Hopes

Associated Cement have been active around 107s., Goodlass Wall at 49s. 3d., did not keep best prices despite the bigger dividend and proposed 100 per cent share bonus. There was firmness in Lewis Berger 4s. units at 21s. awaiting the financial results. Staveley have come back to 91s. after being up to close on £5, but remained active on market estimates of break-up values. Higher dividend hopes kept Powell Duffryn firm around 33s. 6d. Compared with a month ago, Turner & Newall have been quite well maintained at 100s. 6d., British Aluminium were 45s. 1½d. and higher dividend possibilities put Beechams deferred up to 16s. Griffiths Hughes were 23s., and Sangers 20s. 4½d. Boots Drug provided a good feature with an advance on the month from 51s. 6d. to 57s. 9d. under the influence of the results and 100 per cent share bonus news. British Drug 5s. shares were 10s. 6d.

Oils fluctuated under the lead of Anglo-Iranian hopes and fears, shares of which have been maintained at a little over £5 since the Persian crisis. Shell have been well active in expectation that efforts will be made to step up production.

Nationalisation Committee

A COMMITTEE has been appointed by the Norwegian Government to examine the question of State purchase of mines and mineral deposits now in private ownership. The Ministry of Industry states that since the war the Government has secured the majority of shares in several large mining companies and has various mining rights.

'Mineral deposits are natural resources which should be exploited for the benefit of society as a whole,' says the Ministry, which goes on to point out in its statement that the search for and investigation of mineral deposits require expensive equipment and highly qualified technicians which only the State can afford. Moreover, when a deposit is exhausted, other work must be found for the miners, and the problems which arise in this connection can be solved only by the State and other public authorities. 'Therefore the question arises whether the State should take over all mining and secure an exclusive right to all mineral deposits. The Ministry is of the opinion that society has a right to have this question clarified.'

A. O. Schei, a Supreme Court Judge, has been appointed chairman of the Committee.

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